IMPLEMENTATION OF BLENDED LEARNING FOLLOWING A YEARLONG PROFESSIONAL DEVELOPMENT PROGRAM: A DESCRIPTIVE CASE STUDY

by
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Abstract

Research findings support the efficacy of the blended learning modality as a way to engage students and extend learning beyond the physical classroom but also note persistent barriers to teachers' technology integration efforts. The purpose of this qualitative descriptive case study was to consider the ways in which teachers implemented blended learning, specifically their decision-making processes and perceptions of changes in attitudes and beliefs about practice. The context of the study was a blended learning cohort professional development program that took place over the 2016–2017 school year across a small school division in the southeastern United States. After initial semistructured interviews with nine blended learning cohort participants, three middle school teachers were purposively selected who showed particularly high levels of engagement in the blended learning cohort. Main case study data sources were two semistructured case study interviews and four face-to-face classroom observations. Four online classroom observations, using Google Classroom, and a researcher's journal supplemented the data. Theoretical thematic analysis was used to identify themes within and across cases. Cohort themes included: increased comfort with peer collaboration, improved student engagement, and appreciation for the asynchronous and synchronous blended format of the professional development program. Case study themes reflected that blended learning supports collaboration, differentiation of instruction, student engagement, real-world connections, and student-centered learning practices. Case study participants evinced positive attitudes and beliefs regarding the efficacy of blended learning and considered student factors when making instructional decisions. Participants' blended learning implementation varied but included opportunities for student choice and multiple paths for students to demonstrate mastery of knowledge. The researcher found that participants' classroom management hindered blended learning implementation.

Participants also noted challenges related to devices and infrastructure, administrative expectations, and time. Study limitations included the sample size, and length of study. Technology professional development offerings that are embedded in the school day, offer participants opportunities to develop appropriate classroom and technology management strategies, include technology facilitation support, and encourage technology collaboration were recommended.

Keywords: blended learning implementation, technology integration, professional development, teacher decision making

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Dedication

This dissertation is dedicated to my amazing Mommers and Daddles. You are truly the greatest gifts I have been given and I love you dearly. You are my role models and your wisdom, wit, and encouragement have helped me strive to achieve my goals. Your love and support sustained me during the seemingly endless writing process.

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Executive Summary

Blended learning has been endorsed as a way to engage students (Carver, 2016; Smith, 2014) and extend learning beyond the physical classroom, but persistent barriers hinder teachers' technology integration efforts (Al-Awidi & Alghazo, 2012; Christensen & Knezek, 2017; Hechter & Vermette, 2014; Hsu, 2016; Jones & Dexter, 2014; Wachira & Keengwe, 2011). This descriptive case study focused on middle school teachers' blended learning implementation following their participation in a yearlong, embedded professional development (PD) program. Specifically, teachers' decision-making processes and perceptions of changes in attitudes and beliefs about instructional practice were explored.

Problem of Practice

As school divisions (i.e., districts) increasingly implement 1:1 computing initiatives, in which the district provides a computing device to every student, instructional technology has become increasingly intertwined in the educational process (Dexter, 2011; Richardson et al., 2013; Topper & Lancaster, 2013). These 1:1 initiatives feature laptops, tablets, or iPads, necessitating that students and teachers alike navigate the device together and requiring teachers to decide how to best use the technology in the classroom setting (Dunleavy, Dexter, & Heinecke, 2007; Spires, Oliver & Corn, 2011). Embedded practice in technology application and linking technology PD to specific learning pedagogies can result in teachers being better prepared to implement technology (An & Reigeluth, 2012; Jones & Dexter, 2014; Mullen & Hutinger, 2008). Teachers' post-PD technology use should be examined to determine whether technology PD is efficacious (Jones & Dexter, 2014). In the context under study, middle school teachers' post-PD technology implementation was explored to better understand why and how teachers implement blended learning following a blended learning cohort PD program.

Context

The context for the study was the Applegate Valley Public School division (all names are pseudonyms) located near a large metropolitan center on the East Coast. Applegate Valley Public Schools features a diverse student population of over 15,000 students from 134 countries who speak 113 languages and the school division is comprised of 36.08% Hispanic, 28.46% Caucasian, 26.83% African American, 5.32% Asian, and 2.88% Multi-racial, 0.20% Native American, and 0.17% Native Hawaiian/Pacific Islander students. Over 61% of students are eligible for free and reduced price meals. Applegate Valley Public Schools has 18 schools, including two middle schools, two K-8 schools, one pre-K school, and a comprehensive high school with nearly 4,000 students across three separate campuses.

Teachers in Applegate Valley Public Schools had smaller class sizes than surrounding school divisions, and did not require teachers to complete supplemental duties (e.g., lunch, bus, or hall supervision) as part of their instructional day. This schedule was due to the school division's commitment to instructional technology, a prioritization of smaller class sizes, and a belief that teachers should focus solely on instruction rather than on non-teaching related duties. The wealth of technology within the school division was evident in student access to technology, such as 1:1 devices for all students in Grades 3–12. Students without Internet access at home were able to check out portable Wi-Fi devices from their school or visit any of the various locations throughout the city that had been equipped with school division hotspots.

Two middle schools within Applegate Valley Public Schools provided the settings for this dissertation study: Sterling Creek Middle School (SCMS) and Valley View Middle School (VVMS). All grade-level teachers at SCMS and VVMS had common planning periods to aid in their ability to plan lessons collaboratively. Teachers and students were grouped in small student

learning communities called teams (e.g., Grade 6-Team 1 or Grade 6-Team 2) so that students on a team shared the same set of teachers. Both middle schools were technology-rich environments with a 1:1 computing device initiative, a robust Wi-Fi network, the placement of two technology integration specialists (TISs) per school, and an in-house technology helpdesk in each school.

Conceptual Framework

This study is framed by Clarke and Hollingworth's (2002) interconnected model of professional growth, which contains four interrelated domains of change: personal domain, external domain, domain of practice, and domain of consequence. Change sequences within this model occur when a change in one domain causes a change in another domain through the process of reflection or enactment (i.e., action) by the teacher. According to Clarke and Hollingsworth (2002), the personal domain centers on individual teachers' knowledge and beliefs and the external domain refers to outside sources of support and information. The domain of practice is described as teachers' experimentation with ideas and the domain of consequence represents the salient outcomes stemming from changes in teachers' perceptions of practice and personal beliefs. Reflection and enactment link the different domains within the model to facilitate change. The lack of a linear path within the interconnected model of professional growth indicates that change is individualized to the teacher and the particular experience (Clarke & Hollingsworth, 2002).

Purpose and Methodology

The purpose of this study was to determine the ways in which middle school teachers implemented blended learning following their participation in an embedded yearlong comprehensive blended learning cohort PD program. The following three research questions guided the dissertation study:

1. What are teachers' perceptions of changes in attitudes and beliefs about instructional practices after a blended learning professional development program?
2. How do teachers implement blended learning after a blended learning professional development program?
3. What are teachers' decision-making processes when implementing blended learning after a blended learning professional development program?

Research Design

This study used a descriptive case study approach. Descriptive case studies describe a phenomenon or intervention and the environment in which it occurred (Yin, 2003) and are suitable when conducting a detailed investigation within a context (Yin, 2009). An effective case study is one that uses an in-depth examination of a program, experience, endeavor, process, or one or more individuals (Stake, 1995). A case study design is appropriate when asking *why* or *how* questions (Yin, 2003). In this study, I explored teachers' implementation of blended learning following participation in a blended learning PD program.

Data Collection and Analysis

The data collected in this study consisted of post-PD semistructured interviews, classroom observations, and the researcher's journal. Data collection began in February 2018, which was 18 months after the start of the yearlong blended learning cohort PD program. A semistructured interview with nine of the 13 original cohort members aided in the purposive sampling for the case study (Flick, 2009). Case study participants were observed two times and then interviewed individually, followed by two additional observations and a second interview.

Interviews were conducted at teachers' schools at times that were convenient for each participant. In addition to field notes, participant responses were audiorecorded with a digital

recording device, securely uploaded to Google Drive, and transcribed verbatim. Face-to-face classroom observations were conducted during mutually agreed upon class periods, although the specific observation dates were unannounced to more accurately capture teachers' blended learning implementation. The researcher was granted auditor status to participants' Google Classrooms to conduct the unannounced online classroom observations. All data were analyzed using Braun and Clarke's (2006) steps for thematic analysis: familiarizing oneself with the data, developing initial codes, searching for themes, reviewing the themes, defining and specifying themes, and generating the final report.

Findings

The case study data revealed that blended learning supports collaboration, differentiation of instruction, student engagement, real-world connections, and student-centered learning practices. Case study participants evinced positive attitudes and beliefs regarding the efficacy of blended learning and considered student factors when making instructional decisions. Participants' blended learning implementation varied but included opportunities for student choice and multiple paths for students to demonstrate mastery of knowledge. The researcher found that classroom management hindered blended learning implementation and case study participants noted challenges related to devices and infrastructure, administrative expectations, and time. Study limitations included the sample size and length of study. Recommendations include: technology professional development offerings embedded in the school day, providing follow-up opportunities to develop appropriate classroom and technology management strategies, including technology facilitation support, and encouraging technology collaboration.

Chapter 1

Introduction

As schools strive to keep pace with mandated standards, a sizeable gap persists between what students learn in school and what they will need to know to be successful in typical 21st century environments and in future employment (Partnership for 21st Century Skills, 2016). To cultivate universally conscious and connected citizens, schools should thread 21st century capabilities and skills such as global awareness, critical thinking, and innovation throughout the learning experience (U.S. Department of Education, 2016). Learning in the 21st century demands a pioneering and supportive structure that includes "applicable skills and knowledge, appropriate technologies, and real-world connections to make learning relevant, personalized, and engaging" (Partnership for 21st Century Skills, 2016, p. 2). It is necessary, therefore, for teachers to effectively prepare students for post-secondary pursuits by ensuring that students are fully prepared to flourish as adults. Whether post-secondary opportunities include careers or advanced educational endeavors, teachers must be able to effectively integrate technology in their classroom instruction (Partnership for 21st Century Skills, 2016). Indeed, technology that has been designed and applied with care and forethought has the "potential to accelerate, amplify, and expand the impact of powerful principles of learning" (U.S. Department of Education, 2016, p. 9).

One of the numerous definitions for technology integration is the "use of computing devices such as desktop computers, laptops, handheld computers, software, or Internet in K–12 schools for instructional purposes" (Hew & Brush, 2007, p. 225). Technology integration can afford opportunities for learners to create knowledge (Yu, 2013). In traditional classroom settings, student learning is formulated and directed by the teacher. Twenty-first century

instructional technologies, however, have offered new and innovative resources for student learning and collaboration. Teachers integrate technology into instruction for numerous reasons, including modeling 21st century skills, differentiating student learning, and increasing student attention and engagement (Hakverdi-Can & Dana, 2012; Hechter & Vermette, 2014). "Digital learning tools can offer more flexibility and learning supports than can traditional formats. Using mobile devices, laptops, and networked systems, educators are better able to personalize and customize learning experiences to align with the needs of each student" (U.S. Department of Education, 2016, p. 19).

Successful technology integration, however, consists of more than simply providing students with access to technology. Indeed, "technology can transform learning when used by teachers who know how to create engaging and effective learning experiences for their students" (U.S. Department of Education, 2016, p. 30). Mishra and Koehler (2006) suggest that successful technology integration requires the deliberate cohesion of technology, content, and pedagogical knowledge as parts of a larger whole. Knowledge of technology use should not be considered as separate from knowledge of pedagogy and content; teachers must learn new methods and competencies as existing technologies become outdated (Mishra & Koehler, 2006).

Although successful integration of technology in classroom instruction can have a positive impact in preparing students to become 21st century learners, numerous barriers to effective technology integration exist. First-order barriers to technology integration are extrinsic to teachers and include insufficient: access (Clark, 2006; Hechter & Vermette, 2014; Lim & Khine 2006), time (Hsu, 2016; Wachira & Keengwe, 2011), professional development (PD) opportunities that adequately support new technologies (Jones & Dexter, 2014), and school culture to educational change (Li & Choi, 2014). These first-order barriers, however, appear to

be abating as more schools invest in instructional technology connectivity and device access (U.S. Department of Education, 2016; Wood, Mueller, Willoughby, Specht, & Deyoung, 2005). Teachers' efforts at technology integration are still hindered by persistent first-order barriers such as access to technology and PD programs that do not adequately prepare teachers to effectively use technology (U.S. Department of Education, 2016).

Second-order barriers, on the other hand, are intrinsic to teachers and include teacher beliefs regarding technology (Ertmer, 2005; Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur, 2012; Kim, Kim, Lee, Spector, & DeMeester, 2013; Ottenbreit-Leftwich, Glazewski, Newby, & Ertmer, 2010), technology knowledge (Harris, Mishra & Koehler, 2009), and low teacher self-efficacy regarding technology implementation (Glassett & Schrum, 2009). Technology knowledge is challenging to define due to the constantly changing field of instructional technology but Harris, Mishra, and Koehler (2009) define technology knowledge as the application of technology in a manner that demonstrates a deep understanding and mastery of technology concepts. For the purposes of this study, the term *technology integration* is defined as the seamless incorporation of technology concepts into classroom instruction and *technology implementation* is defined as the process of using technology in the instructional setting. Although first-order barriers are decreasing, second-order barriers to technology integration continue to remain problematic (Ertmer, 1999, 2005; Jones & Dexter, 2014; Li & Choi, 2014).

Even as first-order barriers continue to decrease, navigating the rapidly changing field of instruction can be challenging for teachers who may lack sufficient preparation or do not regard technology integration as essential to instruction. The continual influx of new technologies can present additional barriers for teachers who may struggle to use technology in classroom instruction (Harris et al., 2009). Despite concerted efforts to increase access to technology and

access to technology PD, technology integration remains low (An & Reigeluth, 2012; Bauer & Kenton, 2005; Mishra & Koehler, 2006; Otto & Albion, 2004).

Schools that have remedied many first-order and second-order barriers to technology integration may present as technology-rich environments in which teachers' use of instructional technology is encouraged and celebrated. A recent educational technology trend is blended learning, which is becoming increasingly popular as more school districts offer online courses in addition to traditional face-to-face courses (Picciano, Seaman, Shea, & Swan, 2012). Blended learning has multiple definitions and these definitions continue to evolve. Staker and Horn (2012) offer the following:

> Blended learning is a formal education program in which a student learns at least in part through online delivery of content and instruction with some element of student control over time, place, path, and/or pace and at least part at a supervised brick-and-mortar location away from home. (p. 3)

Blended learning offers flexibility for teachers as well as students and has the potential to increase student engagement (Carver, 2016; Smith, 2014). Student control over place, time, and path is an essential component when seeking to differentiate between blended learning and instruction that is technology-rich. Teachers may choose to participate in distance learning courses or online PD opportunities that offer blended learning components to ensure ease of access for working professionals (Moe & Rye, 2011). PD opportunities that discuss blended learning and integrate blended learning techniques are increasing, as teachers aim to incorporate varied technology concepts in the curriculum. Similarly, as school divisions increase opportunities for personalized learning, teachers are able to increasingly embed blended learning concepts in the instructional setting. For the purposes of this study, *blended learning*

implementation is defined as teachers' use of a blended learning modality to deliver instructional content. The focus of the following case study is teachers' implementation of blended learning after participation in a blended learning cohort PD program.

Context of the Study

The context for the current study was a blended learning cohort PD program that took place during the 2016–2017 school year in a small school division (i.e., district) on the east coast of the United States. The blended learning cohort PD program originated from the school division's desire to support teachers' technology skill attainment while adhering to the school division's pedagogical and curricular goals. Distinct blended learning cohorts were established at the elementary, middle, and high school levels. Over the course of the school year, teachers attended nine monthly meetings that covered blended learning content specific to their grade levels. These monthly sessions included a book study, direct instruction on how to implement blended learning in their classrooms, and opportunities for peer collaboration (see Appendix A).

Two blended learning coaches, hired by the school division to support the shift to blended learning, and two technology integration specialists (TISs) facilitated each session. Session activities included collaborative discussion, reflection, technology lesson analysis, lesson planning, and a book study of Catlin Tucker's (2012) *Blended Learning in Grades 4–12*. The sessions were conducted in Blackboard via Blackboard Collaborate web conferencing software as well as in-person meetings. The use of Blackboard as the learning platform provided opportunities for the cohort to interact online after the sessions ended via optional discussion boards and blog posts.

In the first monthly session, teachers examined the iNACOL blended learning teacher competency framework (Powell, Rabbitt, & Kennedy, 2014), collaboratively generated a specific

definition of blended learning for the school division, completed iNACOL blended learning competencies self-assessments, and began reading Tucker's (2012) book. The book discussion continued through the first six sessions of the blended learning cohort PD program. The school division's collaboratively developed definition of blended learning implementation was: the connection of educational technology in face-to-face classrooms to enhance and personalize a deep and meaningful curriculum.

During the second session, teachers established goals specific to their own subject level, examined existing blended learning practices in other school divisions, discussed the first two chapters of Tucker's (2012) text, and learned how Twitter and a digital collaboration board (i.e., Padlet) could be used in blended learning lessons. In the third session, teachers were introduced to The Master Teacher Project, which is a comprehensive lesson plan sharing website, and continued a discussion of the third chapter of Tucker's (2012) book.

The fourth session introduced teachers to VoiceThread and Today's Meet, which are technology tools that can be used to facilitate or support blended learning instruction. During the fifth session, teachers engaged in dialogue about Chapters 4 and 5 of Tucker's (2012) book, with specific attention given to the ways in which teachers can create safe online communities for students. Additionally, teachers completed a second iNACOL blended learning competencies self-assessment. In the sixth session, teachers became versed in specific blended learning models and discussed Chapters 6–9 in Tucker's (2012) book, which explored technology resources. During the seventh session, teachers examined blended learning research and helped create a cohort research list by contributing their own suggestions for blended learning research and resources. In the eighth session, teachers spent time examining blended learning exemplars such as the Christensen Institute's Blended Learning Universe, The Master Teacher Project, and

Getting Smart 100 Schools, all of which have curated and compiled blended learning resources on their websites. During the ninth and final session, teachers discussed blended learning networking, the technology resources available on two technology websites, www.schrockguide.net and www.cybraryman.com, and completed a third and final iNACOL self-assessment.

Statement of the Problem

As more school districts and divisions implement 1:1 computing initiatives, in which the district provides a device to every student, instructional technology has become increasingly enmeshed in the educational process (Dexter, 2011; Richardson et al., 2013; Topper & Lancaster, 2013). These 1:1 initiatives feature laptops, tablets, or iPads, necessitating that students and teachers alike navigate the device together and teachers have to decide how to best use the technology in the classroom setting (Dunleavy et al., 2007; Spires et al., 2011). Providing embedded practice in technology application and effectively linking technology PD to specific learning pedagogies can result in teachers being better prepared to implement technology (An & Reigeluth, 2012; Jones & Dexter, 2014; Mullen & Hutinger, 2008). Teachers' post-PD technology use should be examined to determine whether technology PD is adequately preparing teachers for subsequent use of technology (Jones & Dexter, 2014). This qualitative research study will assist in better understanding why and how teachers decide to implement blended learning following a blended learning cohort PD program.

Research Questions

Though the blended learning cohort PD program served as the context of the study, the unit of analysis was teachers' post-PD blended learning implementation. Semistructured interviews and classroom observations were conducted to develop a rich description of

participants' blended learning experiences. To examine teachers' post-PD blended learning implementation, the following research questions were posed:

1. What are teachers' perceptions of changes in attitudes and beliefs about instructional practices after a blended learning professional development program?
2. How do teachers implement blended learning after a blended learning professional development program?
3. What are teachers' decision-making processes when implementing blended learning after a blended learning professional development program?

Research Design

The study utilized a descriptive case study to best describe the phenomenon and the environment in which it occurred (Yin, 2003). Data collection for the descriptive case study began 18 months after the start of the blended learning cohort PD program and included participant interviews and classroom observations. A semistructured interview conducted with nine of the 13 original cohort members aided in purposive sampling for the case study (Flick, 2009). Case study participants were observed two times and then interviewed individually, followed by two additional observations and a second interview. Data obtained from the classroom observations and first case study interview were analyzed concurrently using Braun and Clarke's (2006) theoretical thematic analysis and then used to develop the questions for the second case study interview.

Theoretical thematic analysis (Braun & Clarke, 2006) was used to examine a variety of themes related to blended learning implementation and the reasons teachers decided to implement blended learning post-PD. Theoretical thematic analysis (Braun & Clarke, 2006) entails coding for specific research questions rather than allowing the "specific research question

to evolve through the coding process" (p. 12). In this manner of analysis, themes are derived from an area of interest, based on the literature, and are refined (i.e., expanded or collapsed) throughout the analysis process (Braun & Clarke, 2006). The prior development of research questions thus necessitated a theoretical thematic data analysis approach.

Overview of Constructs

The following section provides a brief overview of two constructs that are integral to this study: teacher decision making and blended learning implementation.

Teacher Decision Making

During the instructional planning process, teachers' decisions are often predicated upon the characteristics of their students and the teaching methods the teachers plan to employ in the classroom. Contextual factors such as mandated curriculum and individual classroom dynamics impact teacher decision making (Perfecto, 2012). Teachers also use data such as student work and assessment results to make educational and curriculum decisions (Jacobs, Gregory, Hoppey, & Yendol-Hoppey, 2009; Perfecto, 2012). Teachers' decision making can be enhanced through recursive PD (Schnellert, Butler, & Higginson, 2008) and collaborative groupings of teachers during technology PD can promote the development of a strong, technology-infused curriculum (Steckel, Shinas, & Van Vaerenewyck, 2015) through collaborative decision making (Parmigiani, 2012). Effective teachers who implement technology often design their lessons with regard to specific curricular goals prior to selecting technology tools (Harris & Hofer, 2011). When choosing technology tools, teachers should decide what may best help them meet their instructional goals and encourage student learning (Shinas & Steckel, 2017). For the purpose of this paper, *instructional decisions* are those in which teachers observe their environment and make decisions based upon their knowledge of these environments (Parmigiani, 2012).

Blended Learning Implementation

As the concept of blended learning continues to develop, so does its meaning. One definition of blended learning is the "integration of classroom face-to-face learning experiences with online learning experiences" (Garrison & Kanuka, 2004, p. 96). Blended learning removes the limitations of a physical classroom by providing students and teachers with the opportunity to extend teaching and learning outside of classroom walls. There are four widely applied blended learning models, as defined by Stake and Horn (2012): rotation, flex, self-blend, and enriched-virtual. In the rotation model, students "rotate . . . between learning modalities, at least one of which is online learning" (Staker & Horn, 2012, p. 8). An example of the rotation model is a flipped classroom, in which students independently review material online prior to the topic being discussed in class. Additional examples of the rotation model include station rotation and individual rotation. During station rotation, students alternate at the teacher's direction among classroom learning modalities that are grouped by relevant skills. During individual rotation, students rotate on an individualized schedule among learning stations, at least one of which is online learning (Staker & Horn, 2012).

The flex model is comprised of primarily online instruction with an onsite teacher providing face-to-face supports via small group teaching, course projects, and one-on-one instruction as needed. In the self-blend model, students take fully online courses while simultaneously being enrolled in face-to-face courses. The enriched-virtual model consists of a whole school atmosphere in which students "divide their time between attending a brick-and-mortar campus and learning remotely using online delivery of content and instruction" (Staker & Horn, 2012, p. 15). Blended learning may also be considered through the lens of a continuum as teachers and students transition from face-to-face traditional models of learning to online and

virtual models of learning. The shift from teacher-controlled to shared-control to student-controlled instruction results in a similar shift in teacher role (Brannan, 2016).

Successful blended learning requires deliberate preparation. There are numerous ways to implement blended learning into the educational program (Jimison, 2011) and blended learning PD opportunities are on the rise, as teachers work to infuse technology concepts in the curriculum. Teachers may choose to create their own blended learning modalities by adjusting daily instruction in a traditional classroom and supplementing with digital resources (Pape, Sheehan, & Worrell, 2012). Other teachers may decide to implement blended learning to support students' educational goals through a reduction of barriers to technology (Darojat, 2016). The implementation of blended learning can lead to shifts in instructional dynamics as student and teacher relationships adjust to a new learning format (Brown, 2016).

Summary

Learning in the 21st century requires that teachers make deliberate efforts to provide students with the requisite knowledge, skills, technologies, and real-world connections that serve to make learning pertinent, individualized, and engaging (Partnership for 21st Century Skills, 2016). Classroom technology use can revolutionize teaching and learning and teachers' efforts to incorporate technology into instruction should be encouraged and supported. Although barriers to teachers' technology integration exist, these barriers may be mitigated by targeted PD. This chapter presented an introduction to the dissertation study, a description of the context of study, research questions, study methodology, and an overview of the constructs. Chapter 2 will provide a thorough review of the literature related to barriers to technology integration, technology PD, and teachers' decision-making processes.

Chapter 2

Review of the Literature: Professional Development to Support Technology Implementation

The purpose of this study was to examine teachers' blended learning implementation following a blended learning cohort PD program. In this chapter, three distinct literature review sections direct the consideration of the influence of PD activities that support teachers' choices to implement blended learning. First, I examine literature related to barriers to technology integration and implementation. Next, I focus on the ways technology-rich school environments may leverage effective technology use through technology PD experiences. Finally, I explore how school culture and leadership influence teachers' decision making and subsequent blended learning implementation. The literature reviews draw on peer-reviewed journal articles published primarily between the years 2004 and 2018. Journal articles that contained limited information regarding methodologies and instrumentation were excluded. Additionally, I omitted articles written prior to 2004, which often referred to outdated technologies; seminal works, however, were included.

Conceptual Framework

The interconnected model of professional growth, developed by Clarke and Hollingsworth (2002), provides the conceptual framework for this study and contains four interrelated domains of change: personal domain, external domain, domain of practice, and domain of consequence (see Figure 2.1). Change sequences within this model occur when a change in one domain causes a change in another domain through the process of reflection or enactment (i.e., action) by the teacher. The interconnected model of professional growth demonstrates that teacher learning and growth occurs via cycles of alternating reflection and enactment that is unique and positioned within individual teachers' understanding (Clarke &

Hollingsworth, 2002). This conceptual framework was selected to establish a structure for teachers' interactions in the four domains as their enactment and reflection during their blended learning lessons guided their implementation efforts.

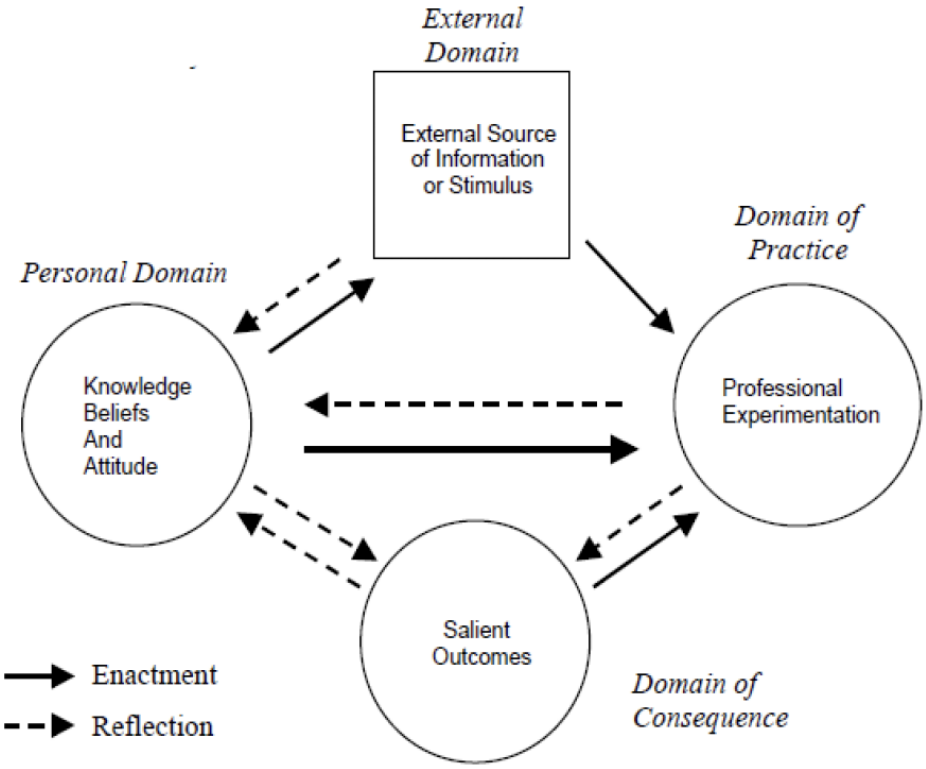

Figure 2.1. The interconnected model of professional growth. In this model, four domains influence teacher change and growth. Connections are made between these domains through enactment and reflection. The personal domain, domain of practice, and domain of consequence, represented by circles, and the external domain, represented by a square, are connected via arrows to indicate the direction of change. In this figure, the solid lines denote enactment and the broken lines denote reflection. Reprinted with permission from "Elaborating a model of teacher professional growth" by D. Clarke and H. Hollingsworth, 2002, *Teaching and Teacher Education, 18*, p. 951. Copyright 2002 by Elsevier Science.

According to Clarke and Hollingsworth (2002), the personal domain focuses on

individual teachers' knowledge and beliefs and the external domain refers to outside sources of support and information. The domain of practice is described as teachers' experimentation with ideas and the domain of consequence represents the salient outcomes stemming from changes in teachers' perceptions of practice and personal beliefs. Reflection and enactment link the different domains within the model to facilitate change (e.g., increases in students' test scores). The lack of a linear path within the interconnected model of professional growth indicates that change is individualized to the teacher and the particular experience (Clarke & Hollingsworth, 2002).

Although the interconnected model of professional growth is centered on professional growth through enactment and reflection (Clarke & Hollingsworth, 2002), it also provides a lens to understand how interconnected factors can influence teacher proficiency. The relationships between the domains can help explain how contextual factors are related to teachers' practices. For example, the personal domain of teachers' technology knowledge, beliefs, and attitudes influences, and is influenced by, the external domain (e.g., PD experiences). The external domain can also influence the domain of practice as teachers' knowledge acquisition can impact their experimentation with new technology tools and strategies. Without external domain input, such as technology PD opportunities or a school setting that supports technology experimentation and technology participation, teachers may not be afforded opportunities to stimulate professional growth.

Section 1: An Examination of Barriers to Technology Integration and Implementation

Both first-order and second-order barriers inhibit teachers from successfully integrating technology in their classrooms. First-order barriers to technology integration are extrinsic to teachers and include insufficient: access (Clark, 2006; Hechter & Vermette, 2014; Lim & Khine 2006), time (Hsu, 2016; Wachira & Keengwe, 2011), PD opportunities that adequately support

new technologies (Jones & Dexter, 2014), and school culture receptivity to educational change (Li & Choi, 2014). Second-order barriers include teachers' pedagogical beliefs (Ertmer, 2005; Ertmer et al., 2012; Kim et al., 2013; Ottenbreit-Leftwich et al., 2010), teacher self-efficacy beliefs regarding technology use (Glassett & Schrum, 2009), and technology knowledge (Harris et al., 2009; Mishra & Koehler, 2006). The following literature review explores both first-order barriers to technology integration (i.e., access, time, technology PD, school culture) and second-order barriers to technology integration (i.e., student factors, teacher factors).

Access to Technology

Examples of first-order barriers include access to a dependable technology infrastructure and technology resources in the classroom, which are integral to effective technology use by teachers (Clark, 2006). Four focus groups, consisting of 58 teachers, administrators, and division level policy makers, participated in a Delphi study by Clark (2006) involving the perceptions of multiple stakeholders in the field of educational technology. Three rounds of stakeholder interviews were conducted to determine participants' perceptions regarding the importance of placing technology in the classroom when possible. Participants identified technology access as central to their ability to teach and learn with technology. This access consisted of classroom technology access, having a 1:1 initiative in place, students having access to technology in the home, and ensuring that the school environment granted access to suitable and trustworthy online content (Clark, 2006). Despite teachers' best efforts, successful use of technology in instruction is predicated on access to robust technology infrastructure.

Supporting Clark's (2006) findings regarding the importance of technology access, Lim and Khine (2006) noted that additional research is necessary to determine how schools might ameliorate existing barriers to access. The researchers examined four schools in Singapore that

had previously reported high levels of technology use in a survey. The researchers conducted observations in which technology was used as well as unstructured interviews with principals, department heads, and teachers. Stakeholders discussed barriers encountered as they attempted to use technology and described approaches that were used to address these barriers. Findings showed that a lack of access to reliable classroom technology hindered seamless implementation of technology. Schools were resourceful, however, in maintaining high levels of technology use despite the barrier of access. In one school where access to technology was limited, teachers developed a monthly schedule to share the available technology resources. Another strategy to overcome the issue of reliable technology included the addition of technical support personnel to assist with technology troubleshooting, assessment of equipment, and software installation. Lim and Khine suggested that schools provide upgrades to existing technology to reduce first-order barriers and increase teachers' abilities to integrate technology.

Access to technology emerged as the most common barrier to technology integration by Hechter and Vermette (2014), but the researchers also considered whether teacher knowledge application might create internal barriers to access. Hechter and Vermette distributed a 10-question online survey to school superintendents throughout Manitoba, Canada, including 22 school divisions and 16 independent schools. The superintendents then forwarded the survey to their science K–12 teachers ($N = 433$, response rate of 85.7%) who answered demographic, Likert-type, and open-ended questions. Of the barriers to technology integration listed in the survey, 67% of respondents indicated access to technology as the most frequently selected barrier. The barrier of access manifested as technology being unavailable at convenient times, insufficient amounts of computing devices available to meet student needs, school division restrictions regarding online content access, and lack of teacher choice regarding specific

technologies (Hechter & Vermette, 2014). In this study, the two main teacher-identified barriers to technology integration were both first-order barriers: access to technology and time available for technology implementation (Hechter & Vermette, 2014).

Time Available for Technology

In addition to access to reliable technology, time persists as a first-order barrier to technology integration. Bauer and Kenton (2005) sought to understand reasons for teachers' inability to successfully integrate technology and determined that time and access were noteworthy barriers. Participants were obtained through snowball sampling, as school administrators nominated teachers who were perceived as proficient technology users. Participants came from two elementary schools, one middle school, and one high school in a large school district in a Southern state. The researchers used data gathered through classroom observations, surveys, and interviews to investigate teachers' perceptions of barriers to successful technology integration.

The participants in Bauer and Kenton's (2005) study reported *time to incorporate technology into the curriculum* as a persisting obstacle to technology implementation. Specifically, teachers stated that the combination of limited planning periods, in conjunction with diminished time for students to use technology, substantially reduced the time available to implement technology. Some teachers in the study reported that the amount of available technology made it challenging to embed technology within the time allotted for a class period. Additionally, the lack of consistent technology hardware presented challenges to instructional technology use. During interviews, some study participants shared concerns regarding the additional burden of creating backup lesson plans in case of technology malfunction. Thus, in some settings, both time and access were barriers to technology use.

Bauer and Kenton (2005) posited that lack of time to sufficiently include technology in the curriculum led to teachers being less likely to dedicate themselves to using technology to support student learning and offered three suggestions. First, the school administration could modify the school schedule to allow for an increase in available time. Second, the researchers proposed the creation of a technology coordinator position to assist in the development of technology-infused and technology-based lessons for teachers who lacked time in their own schedules for such planning. The researchers felt that the technology coordinator's activities could potentially free up teacher time and provide ready access to prepared technology resources and lessons. Finally, Bauer and Kenton (2005) stated that updated expectations regarding teacher time and preparation were necessary to effectively prepare teachers to leverage classroom technology.

Lack of time to leverage instructional technology was the focus of a research study comprising 20 teachers enrolled in a graduate-level mathematics and technology education course at a large Midwestern university. The purpose of the study by Wachira and Keengwe (2011) was to investigate urban teachers' perceptions regarding barriers that impede technology integration in their mathematics instruction. The mixed methods study incorporated interviews, questionnaires, and classroom dialogue notes. Study participants identified time as a significant impediment in their ability to integrate technology and noted that the lack of time stemmed from accountability pressures such as preparation for state exams or a need to meet curriculum targets (Wachira & Keengwe, 2011).

Additionally, Wachira and Keengwe's (2011) participants stated that the amount of time spent managing classroom behavior increased when technology was used, which reduced their motivation to use technology. Teachers reported that the barrier of access, when combined with

insufficient time, rendered technology integration largely futile; an observation that supports earlier findings by Bauer and Kenton (2005). Wachira and Keengwe (2011) stated that teachers needed "time to learn, time to plan, time to collaborate with other teachers and time off to engage in PD opportunities . . . where they can develop positive dispositions towards technology use" (p. 23).

Time also emerged as a barrier in a mixed methods study by Hsu (2016) that sought to examine beliefs, techniques, and barriers to technology integration among K-6 teachers in the Midwestern United States (Hsu, 2016). A total of 152 teachers completed a survey containing 22 open-ended questions. As with prior studies, the survey results showed that time remained a barrier across the different grade levels. Following survey data analysis, Hsu chose eight teachers, using maximum variation (Stake, 1995), for semistructured interviews and classroom observations. In a departure from previous studies, second-order barriers to technology integration superseded time as a barrier. Specifically, teachers' pedagogical beliefs and self-efficacy beliefs regarding technology use were findings based on qualitative data sources. Hsu (2016) determined that if teachers are to be adequately prepared to use classroom technology, they must have additional preparatory instruction and regular exposure to technology.

Technology Professional Development

Many current technology PD models are not equipped to prepare teachers to effectively integrate technology (An & Reigeluth, 2012; Jones & Dexter, 2014; Mouza, 2002; Phelps & Graham, 2008; Topper & Lancaster, 2013). The traditional PD model remains mired in a one-size-fits-all approach that is primarily focused on technology skill building (An & Reigeluth, 2012), with few offerings differentiated to meet the various ability levels of attendees. Current PD offerings often do not embed time in the school day for teachers to practice using new

technology content nor provide teachers with a foundation in the relevant pedagogical framework associated with the technology skills being presented (Mullen & Hutinger, 2008; Topper & Lancaster, 2013). Failure to incorporate more learner-centered instruction within PD sessions may result in teachers being less prepared to encourage student-centered technology learning (An & Reigeluth, 2012). Instructors with student-centered beliefs are more likely to implement blended learning educational practices (Brown, 2016); student-centered beliefs can be described as a "pedagogy that incorporates collaborative projects defined partly by student interest" (An & Reigeluth, 2012, p. 54).

Professional development in 1:1 environments must be tailored to meet the distinct needs of a 1:1 setting (Donovan, Hartley, & Strudler, 2007; Hew & Brush, 2007), in addition to being designed with an appropriate PD model. Teachers in 1:1 environments need specific types of instruction and technology preparation to effectively integrate technology into the curriculum (Dunleavy et al., 2007). These teachers, for example, may require support in handling classroom management issues precipitated by student computing device access (Hew & Brush, 2007). Additionally, teachers in these settings may have unique technology curriculum requirements that necessitate additional teacher work obligations (Donovan et al., 2007).

A qualitative case study conducted by Dunleavy et al. (2007) examined the benefits and unique challenges experienced in 1:1 environments. Participants included students, teachers, and administrators from two schools. Eight teachers, an unspecified number of students, the principal, and the technology coordinator from each site participated in interviews, and the researchers also conducted classroom observations. The use of 1:1 devices aided in the development of a more student-centered environment by allowing teachers to design more self-paced lessons, as students were able to use the computing devices both at school and at home.

Although benefits of the 1:1 initiative were identified, participants shared concerns regarding classroom management issues. The researchers noticed that some participants had to repeatedly redirect students when using computing devices and encountered isolated examples of teachers who were unable to successfully manage student behavior within the constraints of the 1:1 environment. PD opportunities that are specific to 1:1 environments might better prepare teachers to create suitable lessons, understand how to best leverage students' technology use, and address classroom management challenges that may arise (Dunleavy et al., 2007).

The need for PD that is specific to 1:1 environments is supported by a longitudinal study conducted by Topper and Lancaster (2013). Over a 2-year period, the researchers conducted onsite visits in five school districts with 1:1 programs. The study purposes were to determine how and why school districts implemented these initiatives, available teacher preparation and support, expectations and assumptions underlying the 1:1 adoptions, and how the programs were evaluated. To gather information, the researchers interviewed primary technology decision makers such as superintendents, principals, curriculum specialists, and technology directors. The researchers found that teachers were being provided with technology instruction but that the PD was inadequate to provide a basis for subsequent technology use.

> Traditional methods of professional development where teachers are provided with tool-specific training, but not with the time or opportunity to explore and learn to integrate these tools into their classroom practices, are unlikely to result in benefits for students measured by improved academic achievement. (Topper & Lancaster, 2013, p. 356)

School districts must plan for "regular, relevant, and ongoing teacher professional development" (Topper & Lancaster, 2013, p. 354), terms that were left undefined by the researchers. The authors noted that school districts that embedded PD opportunities during the

school day saw greater technology use. Additionally, they emphasized the importance of furnishing teachers with embedded opportunities for technology skill practice and dedicated time to learn how to integrate technology.

Teachers should be provided with immersive PD opportunities that allow them to collaborate relative to technology use (Jones & Dexter, 2014). Consideration of different ways in which individuals learn, such as collaboratively or as part of a community of learners, may prove successful when incorporating instructional technology (Jones & Dexter, 2014). Even with superior technology PD offerings, however, teachers may struggle to successfully integrate technology if they do not feel that their school culture is supportive of technology use (Jones & Dexter, 2014).

School Culture

Although ongoing, well-designed PD is critical in preparing teachers to accurately implement new technologies, the culture of a school also plays an important role in teachers' technology use. School culture can be defined as the capacity to access resources via social relationships within the school (Frank, Zhao, & Borgman, 2004). School culture, specifically the ways in which the culture of a school intersects with school leadership, will be discussed in depth in the third section of the literature review.

Role of Students and Classroom Management in Technology Integration

In addition to technology PD, the role of students and classroom management must be considered as technology becomes increasingly ubiquitous in schools. Classroom procedures, teachers' management of students' technology misbehavior, and student knowledge have been considered as factors in students' engagement with technology devices and teachers' attempts to integrate technology. As students shift from consumers of knowledge to creators of knowledge,

the field of education is undergoing a transformation (Johnson, Adams, Estrada & Freeman, 2015). Many teachers feel that sharpening students' technology skills can result in "deeply engaging learning experiences in which students become the authorities on subjects through investigation, storytelling, and production" (Johnson et al., 2015, p. 14). Indeed, online and mobile tools make it "increasingly possible for students to enhance their collaboration skills anytime and anywhere" (Johnson et al., 2015, p.12). Despite these benefits, instructional technology use may cause/exacerbate negative student behaviors and lead to challenges with classroom management.

Classroom management comprises teachers' actions designed to address students' behaviors to better support student learning. Specifically, classroom management includes teacher actions such as creating and sustaining order, providing effectual instruction, handling misbehavior, attending to students' individual needs, and managing group procedures (Emmer, 2001). Effective classroom management is essential for successful integration of technology concepts (Lim, Pek, & Chai, 2005) and is also central to the overall functioning of instructional settings. Technology integration can result in paradigm shifts in the classroom (Christensen & Knezek, 2017) and these shifts can lead to challenges related to classroom management (Ottenbreit-Leftwich, Liao, Sadik, & Ertmer, 2018).

A longitudinal multiple case study, led by Ottenbreit-Leftwich et al. (2018), followed a group of four teachers throughout their teacher education program, student teaching, and during their first two years of teaching. The researchers sought to consider whether the additional educational technology coursework and field experiences during teacher education programs would be sufficient to surmount barriers to technology integration in the K-12 school setting. Data were collected via analysis of teachers' e-portfolios, face-to-face semistructured interviews,

and online semistructured interviews. All four participants developed their technology knowledge and classroom management knowledge through self-experimentation with technology concepts and were influenced by peer mentors and their individual teaching settings. During their student teaching experiences, participants in 1:1 settings stated that the barrier of classroom management challenges arose due to the need to manage students' technology behaviors in these environments. These classroom management challenges persisted during the first two years of teaching but decreased as teachers grew more confident in their technology use practices and as teachers were able to increase students' engagement. As participants became more familiar with technology, their ability to problem solve was seen as a determining factor in their increased technology self-efficacy beliefs.

Participants' strong technology self-efficacy beliefs remained high throughout the study and generally increased in each successive interview as teachers became more comfortable with technology implementation and classroom management (Ottenbreit-Leftwich et al., 2018). As participants moved through their first two years of teaching, not all technology practices remained representative of teachers' technology integration goals. Participants who taught in technology-rich schools were able to continue experimenting with technology and all four participants demonstrated an expansion of technology knowledge as well as greater flexibility in their classroom technology integration. As noted in Ertmer's (2005) study, the specific setting in which pedagogical beliefs are applied can influence the manner in which those beliefs manifest.

Schools with limited technology resources often contained students who lacked technology access, which made it challenging for teachers to require technology-based projects be completed outside of school (Ottenbreit-Leftwich et al., 2018). Similarly, school settings with 1:1 access experienced classroom management challenges as teachers and students attempted to

navigate instructional shifts specific to technology-rich environments. Although some participants successfully managed classroom technology, Ottenbreit-Leftwich et al. (2018) concluded that, despite the technology coursework and field experiences, some barriers to technology integration faced by the participants were too considerable to overcome. The researchers recommended intensive technology preparation in teacher education programs, mentorship opportunities for teachers, and the establishment of supportive school environments to assist teachers in successful classroom technology experimentation.

A mixed methods dissertation study completed by Irby (2017) considered middle school student and teacher perceptions about the effectiveness of technology integration in the classroom. Irby sought to gain a better understanding of computer use in middle school classrooms from the perspectives of the teacher and students. Data sources were the LoTi Digital Age Survey for Teachers (Moersch, 2002), classroom observations, and semistructured interviews with teachers and students. A total of 46 teachers participated in the study and eight teachers were interviewed. A total of 124 students were observed during the study and 16 students participated in individual interviews. Irby found that teachers believed that students would enjoy using technology in school since their students enjoyed technology use outside of school. However, this belief was not substantiated by students' semistructured interview responses. Students who were heavy technology users outside of school were driven by the type of activities in which they were engaged and not specifically by the technology. Therefore, Irby stated that teachers should be cautious when supposing that students' motivation and engagement will grow with an increase in the use of technology related lessons. Additionally, the researcher identified a need for teachers to better understand possible distractions introduced by technology to develop strategies for the reduction of distractions and improvement of classroom

management.

During classroom observations, Irby (2017) witnessed students using technology inappropriately and noted that this technology misuse caused other students to become distracted. Irby posited that if teachers were better prepared to use and manage technology, students may be more motivated, engaged, and less susceptible to distraction. The researcher also recommended additional PD on classroom management and curricular uses of technology to increase student motivation and engagement in classroom lessons. One suggestion for teachers was to collaborate with students regarding the incorporation of technology tools used by students outside the classroom. This collaboration and incorporation could help capture student interest prior to converting the tools for academic use. The use of familiar tools would reduce students' learning curve with new technologies and may decrease student distractions and classroom management concerns.

Collaboration with students was also a recommendation in a study conducted by Keengwe, Schnellert, and Mills (2012). The researchers surveyed 105 students and 13 teachers in a rural Midwestern high school featuring a 1:1 laptop initiative. Although the inherent benefits of a 1:1 environment were described, Keengwe et al. (2012) stated that teachers' priorities should be focused on students' learning, with any technologies being used to support learning goals. Study findings suggested that integration of 1:1 devices increased students' motivation, engagement, and ability to work autonomously. Faculty responses indicated that 1:1 devices improved learning experiences for all students. The researchers noted that students' learning was not as meaningful without the development of appropriate computing practices. Furthermore, collaboration with students was suggested as a method for teachers to learn and understand classroom technology applications. Greater student engagement and proactive technology

implementation has the potential to reduce classroom distractions and classroom management issues. Additionally, the researchers suggested that student-teacher interaction, correct student usage, and effective PD regarding technology integration could transform 1:1 environments and lead to meaningful student learning. Although student factors are related to technology integration, the focus of the current study was teachers.

Teacher Factors

Myriad teacher factors comprise second-order barriers to technology integration. Factors related to teacher decision making (i.e., school culture, school leadership) will be discussed in depth in the third section of the literature review: School Factors Impacting Teachers' Decision Making and Technology Implementation.

Teacher beliefs. Teachers' beliefs regarding technology can have an impact on subsequent use of technology. To examine teacher beliefs and technology practices, Ottenbreit-Leftwich et al. (2010) conducted a mixed methods study using hermeneutical phenomenology and conducted onsite interviews, observed for 20- to 30-minute during an instructional technology lesson, and reviewed teachers' portfolios. The participants included eight female K-12 teachers who were certified as exemplifying the National Educational Technology Standards for Teachers (International Society for Technology in Education, 2008). The teachers' portfolios contained narratives and artifacts of technology use as well as a personal reflection regarding integration of technology. The interviews provided the opportunity for teachers to explain their reasoning for technology use. Interview findings indicated that teachers used technology to help engage and motivate students while also preparing students for post-secondary opportunities. Ottenbreit-Leftwich and colleagues concluded that teachers' positive attitudes and beliefs regarding technology implementation impacted the ways in which teachers used technology to

enhance their own professional practice in addition to classroom instruction (Ottenbreit-Leftwich et al., 2010).

Other studies have also revealed a connection between teacher beliefs and corresponding technology use. A mixed methods study conducted by Ertmer et al. (2012) sought to investigate the alignment between teachers' beliefs and technology practices and the extent that first-order barriers factored into teachers' technology integration efforts. First, the researchers identified 78 classroom teachers who had won awards for their technology practices. Ertmer and colleagues then reduced the sample to 20 teachers whose websites showed the greatest student-centered methods. Student-centered methods were shown through student technology usage, interactivity, resources, and types of student assignments and assessments (Ertmer et al., 2012). Twelve teachers agreed to participate in the study. The researchers examined the teachers' websites and collected data regarding student-centered instruction via classroom observations and video conference or telephone interviews consisting of nine open-ended questions. The findings suggested a relationship between teacher beliefs and technology integration. Teachers identified teacher characteristics as the greatest second-order barrier to technology integration, specifically the attitudes and beliefs of other teachers. The participants reported that teachers' beliefs and attitudes could be a challenge to successful technology use given that many teachers may be intimidated by technologies (Ertmer et al., 2012).

To better understand the connection between teachers' pedagogical beliefs and their educational technology use, Tondeur, van Braak, Ertmer, and Ottenbreit-Leftwich (2017) conducted a comprehensive review and synthesis of 14 selected studies. The researchers built on prior findings of authors such as Inan and Lowther (2010) in considering the ways in which teachers' pedagogical beliefs influence technology use. A meta-aggregative approach was used

to systematically analyze and synthesize qualitative data. Articles that focused on teachers' pedagogical beliefs and how these beliefs related to instructional technology use were eligible for study inclusion. Articles that did not use qualitative methods or were inadequately focused on the topic, as determined by two of the researchers, were excluded; 14 articles were selected for final inclusion. The researchers outlined several findings and recommendations based upon their analyses. If a goal of PD is to change teachers' existing beliefs, the researchers stated that the evidence indicated long-term PDs as most likely to affect change. Specifically, a long-term PD that built on teachers' existing beliefs and provides inquiry-based activities that reinforce positive beliefs had the potential to be successful. A supportive school environment is desirable when seeking to develop an educational vision that encourages thoughtful technology integration (Tondeur et al., 2017). Furthermore, Tondeur et al. (2017) recommended that a shared vision should be established among stakeholders to create viable and effective educational reforms that incorporate technology.

A study examining the integration of mobile learning such as smart phones and tablet computers in the classroom, conducted by (Christensen & Knezek, 2017), sought to determine how teachers perceived mobile learning implementation and how these perceptions related to technology integration. Participants consisted of 1,430 educators in grades K-12 in a large southwestern U.S. school district. The researchers explored the ways in which teachers' self-efficacy beliefs influenced their integration of mobile learning and measured teachers' willingness to implement mobile learning in the classroom setting. Teachers' willingness to implement mobile learning was measured via a researcher-developed Likert-type Mobile Learning Readiness Survey that was administered to participants to assess *possibilities*, *benefits*, *preferences*, and *external influences*. Additionally, participants completed the Stages of

Adoption of Technology survey (Christensen, 2002). Many of the existing barriers to technology integration, such as access, time, and classroom management issues remained true for the integration of mobile learning devices.

Teachers with higher levels of technology adoption presented as more ready to integrate mobile learning technology (Christensen & Knezek, 2017). Results of the Mobile Learning Readiness Survey indicated that teachers with greater years of teaching experience reported less readiness for mobile learning. Mobile learning implementation requires new pedagogies rather than substituting or replicating traditional pedagogical activities (Christensen & Knezek, 2017). The researchers concluded that teachers required professional learning on the pedagogy of integrating mobile learning devices in addition to instruction on beneficial approaches for classroom management to aid in teachers' instructional confidence. Given teachers' role in the creation of learning atmospheres that accommodate mobile learning, increased knowledge of teachers' willingness to integrate these technologies is needed.

Teacher beliefs regarding technology use were the focus of a study conducted by Yu (2013) to explore teachers' attitudes and beliefs regarding emerging technology and to determine barriers the teachers faced when attempting to incorporate technology in instruction. The researcher interviewed 12 elementary and secondary teachers with varied technology backgrounds and years of teaching experience from Mississippi school districts. All teachers were enrolled in a university-level technology course. In a departure from other literature, Yu (2013) specifically recruited participants who were already supportive of instructional technology and interviewed them regarding their integration of technology. Study participants considered instructional technology use as an essential ingredient in the classroom and as an important tool that could enhance students' academic performance. In general, participants held

positive beliefs regarding the efficacy of instructional technology in the classroom setting (Yu, 2013).

Although stating technology use as efficacious, participants noted that they had not integrated technology as much as they would have preferred (Yu, 2013). Barriers to technology integration included technology availability, lack of time, deficient levels of technology support, a shortage of technology resources, and their own technology skill levels. Although teachers were receptive to technology integration, constraints within their school settings, such as availability of technology and time, limited their integration abilities. Additionally, teachers viewed rapidly changing technology modalities as a barrier to technology integration. Findings suggested that even teachers holding positive beliefs toward instructional technology might be less likely to use technology when inhibited by first-order barriers such as time and access (Yu, 2013).

Whereas Yu's (2013) study relied primarily upon qualitative data, Kim et al. (2013) used both qualitative data and robust quantitative data to study teachers' beliefs regarding learning. The researchers led a longitudinal, 4-year mixed methods study designed to examine the beliefs of 22 teachers at the primary and secondary levels. Teacher beliefs regarding learning were measured using Schommer's (1990) Epistemological Belief Questionnaire that consisted of 63 questions and focused on five multidimensional beliefs. The participants analyzed two different styles of classroom structures and responded to questions based on their preferred teaching style. Teacher technology integration levels were measured via classroom observations and semistructured interviews. The researchers noted that teachers who espoused constructivist beliefs were more likely to integrate technology in the classroom. Constructivist beliefs supported the role of the learner as an active participant in the learning process (Ertmer &

Newby, 1993). The development of these constructivist beliefs was attributed to the teachers' epistemology. Teachers who supported student-centered instructional practices had correspondingly positive beliefs regarding technology use (Kim et al., 2013).

Teacher self-efficacy. Teacher self-efficacy is unique to each individual and can be defined as one's belief about his or her ability to complete a specific task or succeed in a specific situation (Bandura, 1986). Bandura identified four sources of self-efficacy: mastery experiences, vicarious experiences, verbal persuasion, and emotional and physiological states. Mastery experience can be defined as a success one has when performing a specific task (Bandura, 1986). When an individual successfully masters a task, this can strengthen his/her/their self-efficacy. Similarly, an unsuccessful mastery experience can weaken self-efficacy. Bandura defined vicarious experience, the second most influential source of self-efficacy, as the effects generated by someone else's achievements. The third source of self-efficacy is verbal persuasion, which Bandura defined as influence from key stakeholders that serves to encourage individuals that they possess the necessary capabilities for success. The final source of self-efficacy is an individual's emotional and physiological state. Each person's individual state plays a role in how one judges their self-efficacy. Teachers who lack instructional self-efficacy may similarly lack technology self-efficacy (Bandura, 1997). Building on Bandura's self-efficacy, technology self-efficacy can be defined as teachers' perceptions of their competence and skills necessary to incorporate technology into their classroom instruction (Innan & Lowther, 2010).

To determine how teachers include technology and PD in their classrooms Glassett and Schrum (2009) conducted a 2-year longitudinal mixed methods research study. Additional consideration was given to the ways in which teachers' pedagogical beliefs and practices might have developed as a result of study involvement. To capture this possible relationship,

researchers established an experimental group and a control group. The research study participants, teachers in urban and rural school districts in a Western state, took part in a large-scale technology cohort designed to provide ongoing assistance and preparation.

Data were collected via focus groups, individual interviews, classroom observations, and criterion-referenced tests administered to the students of teachers in each group. The data indicated that students of teachers in the experimental group performed better on the criterion-referenced tests when compared to their peers in the control group. Additionally, teacher participants experienced marked development in their technology beliefs and technology confidence, as measured by interviews and classroom observations. *Technology beliefs* were operationalized as teachers' perceptions regarding the efficacy of instructional technology, and *technology confidence* was operationalized as the teachers' comfort level with technology use (Glassett & Schrum, 2009). A technology program that featured ongoing support for teacher participants had the potential to impact teachers' beliefs regarding technology as well as their confidence in integrating technology (Glassett & Schrum).

A mixed methods study conducted by Al-Awidi and Alghazo (2012) sought to determine how teachers' self-efficacy beliefs for technology integration might be influenced by their student teaching experiences. Elementary teachers attending the United Arab Emirates University were eligible for study participation, and 62 agreed to participate. Preservice teachers completed the Computer Technology Integration Survey (Wang, Ertmer, & Newby, 2004) before and after teachers' student teaching. Qualitative data were obtained via semistructured interviews conducted with a subset of teachers (n = 16) who reported positive self-efficacy beliefs.

The researchers determined that mastery experience and vicarious experience (Bandura, 1986) were the most influential sources of self-efficacy to integrate technology. Drawing on

Bandura's work, Al-Awidi and Alghazo (2012) posited that teachers' prior successes in integrating technology were a driver in subsequent desires to integrate technology. Additionally, the participants' student teaching experiences aided in the creation of opportunities for successful mastery experiences due to the structure of the university's teacher preparation courses, which were designed to scaffold teachers' knowledge acquisition. The researchers also found that teachers' vicarious experiences were influential in their self-efficacy to integrate technology. Participants reported that witnessing their peers or cooperating teachers' technology integration successes improved their self-efficacy beliefs. When participants lacked the requisite technology integration skills or experiences, they were able to observe successful technology integration practice. Al-Alwidi and Alghazo (2012) found that observation of successful practice increased teachers' self-efficacy beliefs and motivated them to subsequently integrate technology in their teaching. Though teachers' self-efficacy beliefs are integral to technology use, teachers' beliefs related to technology use are also impacted by their technology knowledge.

Teacher knowledge and technology integration. The technological pedagogical content knowledge (TPACK; Mishra & Koehler, 2006) framework is a widely known and respected model for considering technology integration. Mishra and Koehler's (2006) TPACK framework was based upon research conducted by Shulman (1986, 1987) who argued that knowledge and pedagogy should not be treated as discrete domains but rather intersect as pedagogical content knowledge. Teachers' knowledge of their subject matter, in combination with their understanding of pedagogy can be used to make sound instructional decisions regarding student learning (Shulman, 1986, 1987). Similarly, teachers' technology knowledge is not isolated from content knowledge and pedagogy. Building on Mishra and Koehler's (2006) framework, Harris et al. (2009) advised that technology integration cannot be examined from a wholly technological

perspective but must consider the intricate connections between content, technology, pedagogy, and context. TPACK is the result of deliberate and deep connections with content, and teachers who exhibit exceptional instructional technology efforts are skilled in technological pedagogical content knowledge, which may not be inherent but can be taught and learned (Harris et al., 2009). A focus on skills-based technology knowledge alone would not likely provide teachers with the necessary pedagogical foundation. Teachers require PD that is more holistic and less superficial to develop their individual TPACK (Harris et al., 2009). The TPACK framework provides a model that moves away from a narrow focus on technology skills to a larger consideration of relevant factors that help shape technology learning.

Teachers who have acquired a firm grounding in TPACK may integrate technology differently: "The development and demonstration of teachers' TPACK knowledge requires flexibility and fluency—not just with curriculum-based content, but also with pedagogy, technology, and content—remembering that each influences the other in pervasive ways" (Harris et al., 2009, p. 402). Teachers with a strong grounding in TPACK make deliberate and thoughtful choices regarding technology activity selection (Harris et al., 2009). The overall focus is on teacher development of knowledge and how teachers can leverage that knowledge to best meet students' instructional requirements (Harris et al., 2009). In considering the development of teacher knowledge, it is important not to "overlook the dynamic relationships between technology, pedagogy, and content" (An & Reigeluth, 2012, p. 60). Knowledge is the fundamental building block of each portion of the TPACK framework, and, consequently, must be the foundation of teachers' technology integration.

A mixed methods study conducted by Dalal, Archambault, and Shelton (2017) explored the impact of a semester-long technology PD for secondary international teachers in seven

different developing nations. Quantitative data were collected via a survey instrument adapted from Archambault and Crippen's (2009) validated TPACK measure. Qualitative data consisted of a design task completed by each of the 16 participants following the culmination of their semester course. The design task asked participants to create a lesson plan that included a technology integration component. The researchers found that participants considered the affordances of technology, but that lack of technology access hindered their choice and use of technology when planning instruction. Teachers showed improvement in all TPACK domains, with the TCK domain showing the greatest growth. Due to the barriers of access in their home countries, teachers' technology use often consisted of technology tools that could be used without online access. Considering the current global reach of education, Dalal et al. (2017) suggested that findings from their study had potential implications for international technology PD offerings.

Barriers Summary

There are multiple barriers to teachers' successful integration of technology in the classroom setting. These barriers, whether first- or second-order, inhibit teachers' effective use of instructional technology (Ertmer, 2005). First-order barriers include access to technology (Clark, 2006; Hechter & Vermette, 2014; Lim & Khine, 2006), sufficient time available to leverage technology (Hsu, 2016; Wachira & Keengwe, 2011), adequate PD offerings that effectively prepare teachers to implement new technologies (Jones & Dexter, 2014), and school cultures that do not support educational change and technology risk taking (Li & Choi, 2014). Second-order barriers to technology integration include teachers' beliefs regarding technology (Christensen & Knezek, 2017; Ertmer, 2005), student factors (Irby, 2017; Keengwe et al., 2017: Ottenbreit-Leftwich et al., 2018), teacher self-efficacy beliefs (Glassett & Schrum, 2009;

Tondeur et al., 2017), and technology knowledge (Dalal et al., 2017; Mishra & Koehler, 2006). Persisting first-order barriers may be exacerbated by second-order barriers. For example, insufficient time to experiment with technology (Wachira & Keengwe, 2011) may be compounded by PD that does not meet the needs of teachers (Boelens, De Wever, & Voet, 2017; Dalal et al., 2017; Topper & Lancaster, 2013), leaving teachers ill-prepared to integrate technology. Considerable efforts have been made to overcome first-order barriers to technology use and Hechter and Vermette (2014) offered several suggestions to ameliorate barriers that persist, such as the creation of technology focused PD opportunities. The development of professional learning communities was another suggested method for helping teachers enhance their technology integration practices. These findings serve to illustrate the connections and intersections among existing barriers to teachers' technology integration and implementation.

Section 2: Technology Professional Development Experiences

The second section of the literature review examined literature related to technology PD. Current technology PD offerings may not adequately provide teachers with the requisite grounding to support subsequent use of instructional technology (Jones & Dexter, 2014). To effectively implement technology, teachers require unique PD (An & Reigeluth, 2012; Dunleavy et al., 2007; Jones & Dexter, 2014; Topper & Lancaster, 2013). PD that features technology experimentation and dynamic and learner-centered practice can effectively prepare teachers to use instructional technology (An & Reigeluth, 2012). Similarly, immersive and collaborative PD opportunities with technology use can be beneficial (Jones & Dexter, 2014).

Technology Professional Development

Existing technology PD offerings may be inadequate to meet teachers' technology growth needs and decentralized approaches to technology PD can lead to uneven implementation

of technology (Gunn & Hollingsworth, 2013). The authors examined teachers' ($N = 236$) shifting pedagogies regarding technology integration over the course of a 3-year PD experiment that took place in 20 schools. The PD focused on depth and recurring opportunities rather than intermittent PD sessions. Teachers participated in workshops, seminars, and school-based events that corresponded to 8 complete days of PD each year or a cumulative total of 150 hours. Additionally, the participants completed an annual online survey to capture changes in teachers' technology perceptions, knowledge, and use of 21st century learning methods and technologies. The longitudinal study provided a unique opportunity to consider gaps in existing technology PD systems and to establish a necessary context regarding the inadequacy of current technology PD approaches (Gunn & Hollingsworth, 2013). The number of hours teachers spent engaged in technology PD positively correlated with an increase in both their positive perceptions of technology and their technology implementation. Technology perceptions were determined by a yearly increase in positive perceptions and technology implementation over the 3-year study. The authors suggested the need for a new approach to technology PD delivery, as current technology PD models may serve as barriers to teachers' technology integration (Gunn & Hollingsworth, 2013). Intensive and consistent PD, over a prolonged period of time, has the potential to yield positive results in teachers' perceptions and applications of 21st century methods such as diverse assessment practices and differentiation of instruction (Gunn & Hollingsworth, 2013).

The need for improvement in technology PD is supported by Jones and Dexter (2014), who discuss the importance of differentiation of activities and supplementary learning occurring outside of existing technology PD. The researchers selected a large school district that offered technology coaching via dedicated technology integrators who worked closely with teachers to

provide technology resources and assist in technology integration. All mathematics and science teachers at two middle schools participated in the study ($N = 40$). Focus groups were structured by grade level and focus group discussion topics included thoughts on learning to integrate technology, supports necessary for this integration, methods to share technology knowledge, and elements that could encourage or restrict learning.

Scheduling conflicts emerged as a barrier to attending PD sessions, and some participants suggested virtual instruction as a method to obtain the material at a convenient time. Participants reported that sessions with technology integrators were helpful in learning to incorporate emerging technologies in classrooms (Jones & Dexter, 2014). Teachers also positively regarded individual learning opportunities and shared that they would like support from technology integrators to implement teacher-developed lessons. As schools refine technology PD offerings, school leaders should carefully consider the barriers to learning that can be removed and the supports that could be provided to assist learning. Many existing PD offerings provide insufficient support, requiring supplementary systems to assist teachers in technology integration (Jones & Dexter, 2014). Traditional methods of PD, therefore, are possible barriers to technology integration (Gunn and Hollingsworth, 2013; Jones & Dexter, 2014).

As noted previously, 1:1 environments present unique challenges and teachers in these environments require specific types of training and technology preparation to effectively integrate technology into the curriculum (Dunleavy et al., 2007). Specifically, 1:1 environments need tailored PD approaches to effectively prepare teachers to instruct students in a 1:1 environment (Dunleavy et al., 2007). The need for targeted PD opportunities specific to a 1:1 environment is a central theme in a study by Klieger, Ben-Hur, and Bar-Yossef (2010). To properly integrate technology into the curriculum, teachers in a 1:1 environment need structured

and differentiated PD opportunities, as opposed to traditional static approaches (Klieger et al., 2010). An objective of the study was to examine the efforts of a PD model designed to support science teachers' efforts to integrate laptop technology into their instruction.

A qualitative-interpretive case study was used to retrospectively examine the impact of a 1:1 initiative (Klieger et al., 2010). The study took place in a school district that had placed laptops in 11 classrooms across six schools 3 years prior. Eight science teachers across four schools in Israel participated in semistructured interviews. Recommendations included that 1:1 environments require PD approaches be tailored to the individual 1:1 setting to successfully train teachers to instruct students in that specific setting. Using this method could lead to PD opportunities looking different in each 1:1 environment. Additionally, virtual sessions and coaching support should be offered to save teachers' time and to allow them to receive technology coaching when necessary. Incorporating cooperative opportunities can also be beneficial in providing teachers with occasions to share best practices and equally contribute to general technology learning (Klieger et al., 2010). These opportunities for cooperation can be developed through participation in communities of inquiry.

Communities of inquiry. Communities of inquiry have their origins in Dewey's (1933) landmark educational work. Specifically, Dewey's discussion of practical inquiry (i.e., critical thinking and questioning) and reflection are central to the collaboration and experiential learning that characterize communities of inquiry. Dewey's (1933) practical inquiry consisted of pre-reflection, reflection, and post reflection. Dewey (1959) also noted that the process of inquiry is inherently social. Social inquiry can be defined as an integrated process for examining social issues, ideas, and themes (Wood, 2013). The process of social inquiry, in which individuals engage in probing dialogue, can be seen in cooperative groupings of educators who work

collaboratively to develop possible answers to educational problems (Hughes, 2005). This collaborative nature of learning can lead to the social construction of meaning (Dewey, 1959).

Communities of inquiry emphasize the importance of social learning and community engagement in learning. When in-depth learning is a goal of the educational experience, Lipman (1991) states that community is central to the facilitation of critical thinking and subsequent learning attainment. However, many technology PD offerings do not provide embedded opportunities for social inquiry and critical thinking.

An inquiry model, specifically centered on content-based technology integration, was the focus of a longitudinal, explanatory case study conducted by Hughes and Ooms (2004). Teachers in an urban high school with an updated technology infrastructure had access to technology resources, but not all teachers felt equipped with the requisite technology knowledge or direction to subsequently leverage instructional technology use in content area classrooms. The researchers posited that collaborative groupings of teachers could aid teachers' technology learning and their use of technology for student learning. Five teachers from the high school and an additional four university participants, which included both researchers, comprised the inquiry group. Over the course of the 2-year study, the researchers led participant interviews, conducted monthly classroom observations, and joined in monthly inquiry group meetings. Inquiry group participants completed member checks of data to support accuracy.

Hughes and Ooms (2004) used a chronological case study approach to present the data and analyses as they pertained to the specific stages of the study. Phase one consisted of inquiry group members working together to define the purpose of the group and allotted time for a discussion of school-based technology challenges; time and access were mentioned as obstacles. Phase two consisted of participants delineating the topic of their technology inquiry. Phase three

saw participants begin their technology-based inquiry with university participant support. This phase also provided opportunities for participants to collaboratively discuss the challenges and benefits of their instructional technology use.

The researchers found that technology facilitation support within the inquiry group was important (Hughes & Ooms, 2004). As participants began using technology with increasing regularity during this phase, technology implementation barriers such as faulty technology, time, and student learning concerns emerged. A recommendation for future study was to have a technology facilitator serve as a member of the inquiry group to share technology resources and technology information to better support technology experimentation (Hughes & Ooms, 2004). The authors also suggested that an outside facilitator, with experience in technology innovation, might provide a fresh perspective.

Current technology PD approaches often lack opportunities for technology practice and are, therefore, inadequate to meet teacher needs for technology integration (Hughes, 2005). Hughes examined the ways in which teachers learned during technology PD opportunities via a multiple-case embedded research design. Potential participants were screened during phone interviews in which they discussed their technology practices, teaching background, technology-learning experiences, and setting-specific technology resources. Four teachers were selected for the case study based on their perceived contrasts with one another. The researcher conducted life-history interviews specific to their educational technology use and classroom observations of each of the four case study participants. Data were coded and mapped via timelines, figures, and narratives and cross-referenced for patterns among participants.

Hughes (2005) concluded that a content-specific PD approach was more likely to offer perceived value to teachers. Teacher perceptions regarding the value of the technology PD were

directly related to teachers' subsequent incorporation of technology in classroom instruction. The technology PD experiences during this study were content specific, which led to content-specific technology implementation. Hughes also noted that opportunities for scaffolding during PD sessions could lead to more innovative technology practices, and collaborative technology inquiry groups could better support teachers' subsequent technology integration (2005).

Blended learning. Blended learning, which can be defined as the combination of face-to-face and online instruction, is increasing in the educational setting (Graham, Woodfield, & Harrison, 2013). Graham et al. used a case study methodology to examine blended learning implementation at the tertiary level in an effort to provide a guide for tertiary administrators seeking to establish blended learning in their institutions. Data collection entailed telephone interviews with a key informant at each of six universities. Universities were selected for case study inclusion based upon their varying degrees, from low to high, of blended learning implementation. First-order and second-order barriers to blended learning implementation seen at the secondary level persisted at the tertiary level. The researchers developed three stages (i.e., awareness/exploration, adoption/early implementation, and mature implementation/growth) for blended learning implementation and ranked each school according to current implementation efforts (Graham et al., 2013). The questionnaire asked participants to consider challenges to blended learning implementation and the rationale for their decision to adopt blended learning in their organization (Graham et al., 2013). While the study focus was teachers' blended learning implementation, the authors noted that little attention was paid to increasing students' blended learning skills despite the potential benefits of such consideration.

In contrast, a qualitative case study conducted by Darojat (2016) found that considerable resources had been devoted to supporting students who would be participating in a blended

learning environment. The researcher interviewed 14 tertiary educators at two universities in Indonesia and Thailand and asked these individuals to describe the processes they followed when implementing blended learning. The researcher conducted interviews with participants to better understand issues stakeholders faced and successes they attained as they implemented blended learning to examine similarities and differences in blended learning implementation between the two countries. The primary function of blended learning implementation at these universities was to provide equity of access by removing student barriers to learning (Darojat, 2016).

Participants described the supports available to students at each university and Darojat (2016) observed that each university had paid particular attention to developing blended learning communities that supported social presence, teaching presence, and cognitive presence from Garrison et al.'s (2000) community of inquiry model. The breadth of university-developed student resources to aid students' transition to blended learning led to instructors reporting positively regarding student preparation for blended learning (Darojat, 2016). The availability of support was an ongoing theme in the literature and reinforces the importance of appropriate instructional supports as teachers attempt to implement blended learning.

Support is essential if teachers are to effectively implement blended learning. Sufficient time is needed to support teachers, but time continues to be a barrier in the school setting. A case study conducted by Benson, Anderson, and Ooms (2011) investigated the implementation of blended learning at the tertiary level from the perspective of the business school faculty. The examination of the faculty perspective allowed for a better understanding of faculty opinions of blended learning.

The case study approach employed by Benson et al. (2011) consisted of semistructured interviews and utilized purposive sampling to select 16 postsecondary faculty members for study

inclusion. Data analysis examined specific questions related to innovation, blended learning perceptions, and faculty attitudes to technology. Faculty quotations chosen from initial analysis were then categorized to determine similarities and differences. This method of analysis allowed for a rich description of the experiences of blended learning faculty. A thought-provoking conclusion drawn from Benson et al. (2011) was that faculty members were more likely to use technology when the benefits were clearly evident. An additional conclusion of note was that blended learning implementation requires significant time for faculty and time concerns should be considered early in the implementation process. Time is noted as a persistent barrier to technology integration and is a factor in teachers' decisions to implement blended learning.

The enduring barrier of time may be ameliorated when flexibility is incorporated into classroom instruction. A study conducted by Boelens et al. (2017) examined four primary challenges faced when designing a blended learning program. Specifically, the researchers delineated the challenges of integrating flexibility, encouraging interaction, facilitating students' learning, and creating an effective learning environment. The goal of the study was to provide a synopsis of how studies on blended learning settings addressed the four key challenges. A comprehensive examination of existing studies was conducted via a literature review using specific inclusion criteria. The authors' search protocol resulted in 623 studies but this selection was narrowed to 28 after applying the inclusion criteria; a total of 20 studies were selected for study inclusion. These studies were analyzed via a two-phase coding scheme. The authors noted that 18 of the studies were conducted at the tertiary level, with one at the secondary level, and one that did not indicate an educational level.

The authors found a large variation in the integration of flexibility into blended learning settings (Boelens et al., 2017). The blended learning varied according to the sequence of online

and face-to-face activities, and in 17 of the 20 studies the instructor was solely responsible for determining the time spent online versus face-to-face. The authors noted that blended learning settings facilitated interaction through synchronous and asynchronous communication. Six studies discussed the organization of an introductory face-to-face meeting designed to allow learners and the instructor to interact. Blended learning environments facilitated students' learning procedures in a variety of ways that included monitoring, evaluating, and adjusting students' progress. Finally, most studies sought to motivate students as a method for fostering a meaningful learning environment. Instructors also adapted assignments and content based on students' prior knowledge and ability levels. The most significant finding noted by Boelens et al. (2017) was that only a small number of studies gave students control over their own blended learning enactment, instead reserving this choice for instructors. The four challenges explored by the authors represent the most important challenges identified in the literature when designing blended learning environments. The findings help provide direction for instructional settings seeking to incorporate blended learning.

The Partnership for 21st Century Skills (2009) showcases the importance of community in teacher PD. The framework delineates five 21st century support systems that are essential to creating a support system that can support the development of critical thinking and problem solving among students (Partnership for 21st Century Skills, 2009). Professional development, as one of these support systems, should "encourage knowledge sharing among communities of practitioners, using face-to-face, virtual, and blended learning communications" (Partnership for 21st Century Skills, 2009, p. 9). A community of inquiry that incorporated routine use of blended learning techniques, while assisting participants' use of blended learning in their classrooms would align with the Partnership for 21st Century Skills' (2009) vision of 21st century PD for

teachers, which is to provide teachers with the technology knowledge necessary to "collaborate, share best practices, and integrate 21st century skills into classroom practice" (p. 9).

To consider the intersection of community and technology, Vaughn and Garrison (2006) studied the role that blended learning could play in supporting faculty development within a community of inquiry. The researchers used the term *faculty learning communities* to describe a community of inquiry in a secondary education context. Communities of inquiry and blended learning framed the approach to faculty learning communities, yet the scarcity of available research literature addressing blended learning and technology PD was mentioned as an existing limitation. Though all faculty were eligible to apply for study inclusion, Vaughan and Garrison screened candidates for innovation, collaboration, and technology experience, based upon researcher-delineated criteria. Twelve faculty members were selected from 25 applicants. Data were collected from online discussion forum transcripts and from in-person interviews over the course of a semester. Participants' interview responses were categorized using the community of inquiry framework of cognitive presence, social presence, and teaching presence (Garrison, Anderson, & Archer, 2000).

Participants responded positively regarding the social aspects of the faculty learning community and stated that the learning style of the community provided opportunities for the exchange of ideas and resources with peers (Vaughan & Garrison, 2006). The bi-weekly faculty learning community meetings were cited as important to maintaining learning momentum and preserving participant engagement. Discussion was a central component of the participant experience, with participants engaging in collaborative dialogue online and in person. Blending the online and face-to-face learning modalities supported the development of structures that led to habitual practice for participants. In turn, this environment enabled participants to cultivate a

rapport that aided in the sharing of blended learning and technology integration ideas and resources (Vaughan & Garrison, 2006). A blended approach to a community of inquiry, therefore, has the potential to both provide participant support and address possible time constraints that may hamper teachers' availability for technology PD.

An exploratory case study conducted by Wicks, Craft, Mason, Gritter, and Bolding's (2015) extended Vaughan and Garrison's (2006) sample of faculty by also examining the student perspective. Six faculty members, representing a variety of disciplines and teaching experience levels, applied for participation in a blended learning community based on Garrison and colleagues' (2000) community of inquiry model. The goal of the research was to explore the perceptions of 74 students in a blended learning classroom environment at the tertiary level. Student data were collected via a student demographic questionnaire and a course survey, the Community of Inquiry Survey (Arbaugh et al., 2008). The students responded positively regarding interactions with peers and faculty. Online resources and course flexibility were also mentioned as important aspects of the blended learning approach (Wicks et al., 2015). Students' responses indicated self-directed learning and group work as effective components in a blended learning environment.

To explore the faculty perspective, Wicks and colleagues collected data via a Faculty Learning Community Survey (Garrison & Vaughan, 2011) and a faculty interview. The faculty interviews explored reasons for participation in the faculty learning community and reflections regarding the effectiveness of the organization in terms of peer support and the sharing of technology resources. Faculty participants noted that the community experience allowed for learning opportunities that were also enjoyable, but stated that accountability between meetings could have improved the community learning experience. Students and faculty members both

commented on the positive value of learning in a community that supported collaboration (Wicks et al., 2015).

Summary

The review of the literature identifies a relationship between the efficacy of existing technology PD offerings and teachers' subsequent use of technology. PD opportunities that incorporate learner-centered practice are better able prepare teachers to use instructional technology (An & Reigeluth, 2012). Blended learning offers students and teachers opportunities for flexibility (Boelens et al., 2017), but teachers may hesitate to participate in blended learning PD offerings unless the benefits are clear (Benson et al., 2011). Participation in collaborative groupings such as a community of inquiry indicated the potential to provide both teachers and administrators with a forum for collaborative learning (Garrison et al., 2004; Hartnell-Young, 2006; Hughes & Ooms, 2004; Lave & Wenger, 1991; Lipman, 1991; Triggs & John, 2004; Wicks et al., 2015; Zorfass & Rivero, 2005). Collaboration may take the form of technology lesson planning with peers and administration or the shared creation of a community of inquiry model designed to support subsequent teacher participants. Communities of inquiry can provide an organizational structure for teachers and administrators to truly work together to address and plan for technology implementation in the classroom. Similarly, participation in a blended learning community of inquiry can help teachers develop regular technology use practices (Garrison et al., 2004).

Section 3: School Factors Impacting Teachers' Decision Making and Technology Implementation

The third section of the literature review examines literature related to school factors that impact teachers' decision making and subsequent technology implementation. Teachers'

decision-making abilities are impacted by the culture of the school (Frank et al., 2004; Li & Choi, 2014; McKinney, Labat, & Labat, 2015; Perrotta, 2013), institutional supports (Badia, Meneses, & Sigales, 2013: Perfecto, 2012), teacher-obtained data related to student learning goals (Kohler, Henning, & Usma-Wilches, 2008; Parmigiani, 2012; Shinas, & Steckel, 2017), and teachers' perceptions regarding the effectiveness of technology (Demir, 2008; Vannatta & Fordham, 2004). Through examining factors that influence teachers' decision-making practices, a more comprehensive understanding of why teachers decide to use instructional technology may be possible. Teachers may have access to technology and participate in technology PD opportunities but ultimately decide not to implement technology following their PD experiences. Conversely, some school environments may have limited access to technology, but feature supportive school leaders who empower their teachers to take risks with educational technology. Considering the reasons behind teachers' decision-making practices can help better explain why teachers who participate in technology PD opportunities may or may not decide to implement instructional technology post-PD. In many cases, the culture of the school plays a central role in teachers' technology integration efforts.

School culture, or an environment that is conducive to positive academic growth, (McKinney, 2015) can play an important role in teachers' desire to take risks and innovate, specifically in the area of instructional technology (Li & Choi, 2014; Perrotta, 2013; Zhu, 2013). The school environment can play a pivotal role in shaping teachers' technology beliefs (Perrotta, 2013). Teachers with supportive and receptive school cultures that promote experimentation and innovation are more likely to see the positive benefits of instructional technology. A vibrant school culture can enable teachers to feel empowered to explore new technologies (Demir, 2008; Frank et al., 2004; Li & Choi, 2014; Perrotta, 2013).

School Culture and Leadership

School culture is central in supporting teachers' interactions with instructional technology (Frank et al., 2004). In a mixed methods study spanning 2 years, Frank et al. (2004) interviewed and surveyed teachers and principals from six schools in three unspecified states in the United States. During the first year, the researchers conducted interviews with 230 teachers and in the second year the researchers interviewed 143 teachers. The open-ended questions sought information regarding school culture and teacher relationships related to collaborative technology learning. Specifically, the researchers examined whether and how teachers worked together to discover technology uses in classroom instruction. To obtain a school culture measure, the researchers multiplied the frequency with which a teacher received help from another by the expertise of the teacher providing the help (Frank et al., 2004). The specific expertise of the teacher was determined by the quantity of time the teacher spent using computers, the number of applications with which the teacher was familiar, and the teacher's confidence with computers.

The authors determined that the culture in a school could be leveraged to better facilitate change and noted that the willingness of teachers to help each other use technology was based on whether the school was perceived to be a community, which was defined as an environment that contained organizational supports (Frank et al., 2004). These findings explicate that a school's culture is critical to influencing teachers' receptivity to technology use. School culture is important in influencing teachers' receptivity to technology use, as organizational contexts that were perceived to support technology also featured higher levels of technology use. Change agents who wish to introduce technology innovations in school environments, therefore, should seek to leverage the existing school culture (Frank et al., 2004). For teachers to be comfortable

taking risks with technology, they must feel that the school culture values their efforts (Li & Choi, 2014).

Accordingly, Li and Choi (2014) sought to determine the impact of social capital on teachers' openness to technology integration. 1,100 teachers from 130 primary and secondary public schools in 18 Hong Kong school districts completed a survey with 30 Likert-type questions centered on social capital, PD, and teachers' receptivity to technology. The culture of a school, or social capital, "manifests as collegial trust, access to expertise, and willingness to take risks" (Li & Choi, 2014, p. 1). Social capital can take the form of a receptive school culture, support for teacher risk taking, and a mutually respectful environment (Li & Choi, 2014). An easy way to understand the concept of social capital is to consider it as similar to an investment made in a bank. The school invests in building teacher capacity, and the teachers are able to draw on this investment as needed. The researchers determined that social capital was more influential than PD in determining teachers' use of technology. There is a distinct connection between a school's social capital and teacher receptiveness to technology use in the school and social capital is instrumental in nurturing change in schools and fostering teacher support for technology integration (Li & Choi, 2014). To better understand barriers to technology integration, one should investigate the critical role that school culture plays in teachers' willingness to integrate technology.

Similarly, McKinney et al. (2015) advanced the concept of a positive school culture fostering high staff confidence and enhancing staff performance. McKinney et al. explored the concept of transformational leadership, which encourages all stakeholders to actively participate in the decision-making process. Transformational leadership, combined with concerted efforts to model best practices, were catalysts for positive change in learning environments. The

researchers administered surveys, the Purdue Teacher Opinionaire (Rempel & Bentley, 1970) and the Leadership Practices Inventory (Kouzes & Posner, 2002), to approximately 500 teachers, counselors, and 20 principals and assistant principals and found a correlation among teacher-perceived rapport with the principal and the principal's demonstration of best practices and encouraging a mutual vision for staff.

McKinney et al. (2015) determined that there was a connection between principals who inspired a shared vision and encouraged others to act and teachers feeling a rapport with the principal. Teachers who reported feeling a connection with their principal were more likely to speak positively regarding the principal's leadership in the school. School leaders purposefully sought to foster an environment that welcomed collaboration among colleagues and the deliberate creation of such an environment by school leaders supports the development of a school culture that is designed to encourage mutual collaboration and sharing of resources among colleagues (McKinney et al, 2015). Leaders can create this environment by encouraging collaborative efforts, supporting the growth of rapport among teachers, and promoting the sharing of best practices with peers; developing a collaborative and sharing school culture is contagious and has the potential to quickly spread (McKinney et al., 2015), which supports the idea that school leaders should actively model best practices to positively influence school culture.

When teachers evince more positive feelings regarding school culture, they are more receptive to change (Frank et al., 2004; Li & Choi, 2014; Perrotta, 2013). A study by Perrotta (2013) sought to more deeply examine the multifaceted relationships between the values of technology use as delineated by teachers and the systemic and building-level issues that may cause these perceptions. The mixed methods study used surveys paired with interviews and

observations conducted during school visits to determine if a supportive school culture is necessary for a teacher's willingness to integrate technology. The researcher received responses to a 44-question survey from 683 teachers across 24 secondary schools. Teachers in low-income schools reported increased benefits, such as students' learning gains, as a result of technology use. A finding from the study was the teacher-identified importance of school leadership to support innovative actions. The data indicated school-level characteristics and cultures may be important in influencing teachers' practices and expectations for technology use, perhaps even more so than teachers' demographic characteristics. Schools that reported an overall positive school culture were more likely to have teachers that felt positively regarding technology use and integration (Perrotta, 2013). Given the teachers' concerns regarding school culture, Perrotta's findings support the pivotal role school culture can play in encouraging teachers' technology use.

To investigate perceptions of teacher leadership in schools with high rates of technology integration and 1:1 computing initiatives, Bradley-Levine, Mosier, and Perkins (2014) explored how teachers' views of their personal leadership capacity in the school were impacted by the school's technology model of whole school, autonomous school, or small learning community. This mixed methods study asked 105 respondents to complete a quantitative survey wherein a subset (n = 23) participated in an interview. An online survey was distributed to 16 schools in Indiana with a response rate of 67.7%. Findings indicated that teachers were more likely to have negative perceptions regarding reforms when they were not involved in the reform process of collaboratively developing a school technology model from its inception (Bradley-Levine et al., 2014). The survey findings were supplemented with interview data. The identified need for teacher participation in reform efforts is consistent with prior studies (Bungum, 2006; Hulpia, Devos, & Van Kerr, 2011; Rodriguez, 2013; Waldron & McLeskey, 2010).

School leaders play a critical role in providing time for teachers to learn to use technology (Lu & Overbaugh, 2009), which could help to reduce the impact of time as a barrier to technology integration and, in turn, support improvement in the school culture. In a quantitative study, 157 teachers from 16 Turkish schools completed a five-point Likert-type survey on either leadership or school culture. Findings indicated that school leadership is a vital influence in all aspects of school culture. Şahin (2011) noted that teachers' perceptions of a positive school culture aligned with strong leadership and that teacher collaboration was viewed integral to the development of a productive school environment. Şahin emphasized the importance of school leaders taking proactive steps to consciously develop opportunities for mutual teacher cooperation as a method for establishing a productive school culture. The knowledge needed for technology focused cooperation and collaboration, leading to increased technology integration, can be supported through technology PD opportunities.

Teacher Decision Making

Many contextual factors influence teachers' decisions to implement technology (Badia et al., 2013). The researchers surveyed 278 teachers across 8 schools in Spain to determine why teachers decided to implement technology. The 22-question survey instrument featured Likert-type questions regarding the reasons teachers decided to implement instructional technology. The researchers were able to identify factors relating to the teacher as well as institutional factors that impacted teachers' decisions to use technology. The extent to which teachers feel supported by institutional systems can result in teachers feeling empowered to use technology. Even in school settings featuring high levels of technological access, teachers valued the availability of technology assistance and ongoing PD. The majority of the population surveyed perceived that their technology and pedagogical expertise was sufficient to manage the available technology

resources in their schools (Badia et al., 2013). Even with high levels of technology competency and fluency, an educational organization that was perceived to support educational innovation was more likely to contain teachers regularly using technology (Badia et al., 2013). Similarly, school environmental factors can shape teachers' decision-making processes (Perfecto, 2012).

In the educational setting, environmental factors such as curriculum requirements and school situations can influence teachers' decision-making practices (Perfecto, 2012). Two secondary teachers from the Philippines participated in a research study that sought to understand the decision-making processes of teachers and the ways in which teachers coped with contextual factors. Data collection consisted of observations and interviews. Teachers considered external constraints such as curricular requirements and specific classroom situations. Both teachers were required to adhere to a state curriculum and use a state textbook, which impacted their decisions when considering lessons (Perfecto, 2012). Teachers expressed frustration that the curricular demands and student needs often did not align, which required frequent deviations from the curriculum to ensure students' learning needs were being met.

Prior to teaching a lesson, teachers' decision making routinely considered the ways in which curricular content could be modified to better suit students' knowledge mastery (Perfecto, 2012). As such, teacher decision making was driven by contextual factors and supplemented by teachers' knowledge of students' instructional requirements. During the lesson, teachers' decision making was guided by individual student needs, time constraints, and knowledge of effective instructional strategies. Teachers' decision-making ability was honed by years of practice in improvisation, which meant that teachers were comfortable with decision making that required rapid recalibration of instruction when it occurred during teaching (Perfecto, 2012). Though institutional supports are essential and contextual factors influence choices, teachers

routinely make instructional decisions based upon students' perceived instructional needs. Teachers' decision-making processes were considered in the dissertation study, and Perfecto (2012) noted that contextual factors influenced this process. Therefore, Perfecto's findings have the potential to inform a better understanding of teachers' decisions.

Teachers make instructional decisions based upon their knowledge of students and how students learn (Kohler et al, 2008; Parmigiani, 2012; Shinas & Steckel, 2017). A study conducted by Kohler et al. (2008) sought to better understand the decision-making abilities of 150 student teachers during and after teaching lessons. The student teachers were asked to make and record two instructional decisions during a 2- to 3-week student teaching unit (Kohler et al., 2008). By asking participants to provide a written description of their decision-making process, the researchers also hoped to examine how written accounts of instructional decision making can facilitate reflective practice (Kohler et al., 2008). After analyzing participant responses via a researcher-developed protocol, the researchers determined that a common theme in decision making was the teachers' desire to modify content for students' knowledge mastery. In reviewing the student teachers' narratives, the researchers concluded that teachers could benefit from opportunities to reflect and critique learning opportunities (Kohler et al., 2008). Student teacher participants made decisions to alter their instruction based upon their observations and interactions with students. These decisions were clarified through the reflective narratives and analysis led to the conclusion that participation in the reflective process could hone teachers' decision-making abilities.

A study conducted by Shinas and Steckel (2017) determined that when effective teachers decide to use technology, they begin their planning with learning goals in mind rather than the specific technology. Teachers considered the learning objectives and student mastery goals prior

to selecting instructional technology aspects that may be used. Teachers also analyzed student learning to help decide the direction of future lessons. The researchers spent a semester observing the classrooms of teachers who were considered to be effective technology integrators, although these characteristics were not defined (Shinas & Steckel, 2017). The authors found that classrooms that incorporated social learning aspects such as homogenous and heterogeneous groupings of students featured higher levels of effective technology use. Learning communities of teachers have the potential to be empowering mediums to help teachers prepare to use technology. The collaborative features inherent in such groupings support teachers' decision-making processes (Shinas & Steckel, 2017).

Although teachers' individual decisions are routinely based upon student factors, teachers also make collaborative decisions based upon group interactions (Parmigiani, 2012). A study conducted by Parmigiani (2012) sought to understand the features of teachers' individual and group decisions. A total of 411 Italian teachers participated in the study. Data collection consisted of a questionnaire that used Likert-type questions and meeting observations. Similar to Kohler et al. (2008) and Shinas and Steckel (2017), Parmigiani noted that teachers' individual decisions were largely driven by students' instructional needs. However, Parmigiani also considered teachers' decisions in a group format and suggested that groups establish a collaborative interaction format designed to facilitate information sharing between individuals to encourage higher levels of participation in group decision-making processes. As substantiated in the literature, teachers' viewed students' learning as the primary factor in their decision-making processes. Teachers' educational decisions consider the variables of the instructional environment and adjust accordingly via a constant reflective cycle (Parmigiani, 2012). In addition to teachers' knowledge of the learning environment, teachers' decision making with

regard to technology may be influenced by their individual beliefs regarding the efficacy of instructional technology.

Teachers' own perceptions regarding the efficacy of technology can also affect their decision to use technology (Vannatta & Fordham, 2004). A study conducted by Vannatta and Fordham found that time commitments to teaching and receptiveness to change are the best predictors in teachers' subsequent decisions to use classroom technology. Time commitment was operationalized as the amount of time spent in training, experimenting with, and exploring technology. Six northwest Ohio schools were asked to participate in the study due to their receipt of a technology grant that provided technology PD to teachers over a 3-year period. A total of 177 teachers across the six schools agreed to participate in the research study. A 71-item Teacher Aptitude Survey, consisting of items from the Teacher Efficacy Scale (Woolfolk & Hoy, 1994), the Teaching, Learning, and Computing Survey (Becker & Anderson, 1998), in addition to researcher-developed items, was administered to all participants.

Although relevant technology PD is essential in assisting teachers to implement technology, teachers' willingness to spend instructional time outside of the contractual school day and their possession of attitudes that encourage risk taking is also critical (Vannatta & Fordham, 2004). The findings suggested that a dedicated time commitment to instruction and a willingness to change, in combination with ongoing and quality technology PD offerings, served as the best predictors of teachers' decisions to employ instructional technology in the classroom. Teachers who approach technology PD with a willingness to try something new and to invest time in learning are more likely to use instructional technology when compared to their peers who may not be willing to spend time learning or experimenting with technology (Vannatta & Fordham, 2004).

School culture and leadership style has the potential to impact teachers' self-efficacy beliefs (Demir, 2008), which in turn can impact teachers' decisions to implement technology. Demir (2008) studied 218 teachers from 66 Turkish schools and examined the relationships between efficacy, transformational leadership, and school culture. Data were collected via four quantitative survey instruments consisting of Likert-type questions. Transformational leadership actions of school leaders were significantly related to teachers' self-efficacy. The study has notable implications for self-efficacy as it relates to school leadership, as the findings demonstrate that self-efficacy can be positively impacted through transformational leadership. A collaborative school culture correlated to increased collective teacher efficacy. Positive teacher beliefs regarding the efficacy of technology implementation do not diminish the importance of teachers' technology knowledge (Demir, 2008). Understanding factors that influence teachers' decision-making practices can in turn lead to a better understanding of teachers' decisions to implement technology.

Summary

Teachers' decisions to use instructional technology are predicated on many factors. A positive school culture and supportive organizational leadership can encourage teachers' technology experimentation and decisions to implement technology in the classroom setting (Badia et al., 2013; Frank et al., 2004; Li & Choi, 2014; McKinney et al., 2015; Perrotta, 2013). Teachers make individual instructional decisions based upon their knowledge of students and to better facilitate student learning (Kohler et al., 2008; Parmigiani, 2012; Shinas & Steckel, 2017). To be successful, blended learning efforts must attain backing from both teachers and school administrators. The literature demonstrates the impact that school culture and school leadership can have upon one another (Kelley et al., 2005; Perrotta, 2013; Şahin, 2011). Specifically, school

leaders are uniquely positioned to influence the existing school culture in a positive manner (Şahin, 2011; Turan & Bektaş, 2013). By influencing change at the foundational level, school leaders who establish a collaborative and cooperative environment can see positive results in teacher and student beliefs and behaviors (Bradley-Levine et al., 2014; Kelley et al., 2005; McKinney et al., 2015).

Teacher beliefs can also be impacted through the creation of a school culture that values technology, as teacher beliefs regarding technology may stem from insufficient technology knowledge (Mishra & Koehler, 2006). Teachers' own perceptions regarding the efficacy of technology can also play an important role in their decisions to incorporate technology into instruction (Demir, 2008; Vannatta & Fordham, 2004). Blended learning, as one type of instructional technology, is on the rise in the school setting (Graham et al., 2013). As teachers consider whether to implement blended learning in their classroom, a positive school culture, a leadership structure that encourages technology experimentation, their own beliefs regarding the efficacy of the technology, their expertise in classroom dynamics, their pedagogical knowledge of the ways students learn, and their ability to choose technology tools that will support students' learning are invaluable.

Conclusion

Chapter 2 presented literature related to barriers to technology integration, technology PD, and teachers' decision-making processes. Multiple barriers to teachers' technology integration persist and can impede teachers' technology use in the instructional setting. First-order barriers include access to technology (Clark, 2006; Hechter & Vermette, 2014; Lim & Khine, 2006), time available for technology implementation and experimentation (Hsu, 2016; Wachira & Keengwe, 2011), PD offerings that do not effectively prepare teachers for technology

integration (Jones & Dexter, 2014), and school cultures that do not encourage technology risk taking (Li & Choi, 2014). Second-order barriers to technology integration include teachers' beliefs regarding technology (Christensen & Knezek, 2017; Ertmer, 2005), student factors (Irby, 2017; Keengwe et al., 2017: Ottenbreit-Leftwich et al., 2018), teacher self-efficacy beliefs (Glassett & Schrum, 2009; Tondeur et al., 2017), and technology knowledge (Dalal et al., 2017; Mishra & Koehler, 2006). Technology PD that is tailored to the specific needs of the teachers and the environment of the particular educational context may help ameliorate these persisting barriers (Boelens et al, 2017; Dalal et al., 2017; Hechter & Vermette, 2014; Topper & Lancaster, 2013).

Technology PD design may require adjustment to better support teachers' subsequent implementation of technology concepts in their classrooms (Dunleavy et al., 2007; Klieger et al., 2010). PDs that include opportunities for peer collaboration can provide support as teachers engage in technology experimentation (Garrison et al., 2004; Hartnell-Young, 2006; Hughes & Ooms, 2004; Lave & Wenger, 1991; Lipman, 1991; Triggs & John, 2004; Wicks et al., 2015; Zorfass & Rivero, 2005). Additionally, participation in collaborative groupings can assist teachers in the development of consistent technology practices (Garrison et al., 2004). Although changes in PD approaches may support teachers' technology implementation, school factors such as school culture and leadership also influence teachers' technology use (Badia et al., 2013; Frank et al., 2004; Li & Choi, 2014).

A positive school culture and a school administration that supports teachers' technology integration can encourage teachers' technology experimentation and instructional technology decision-making processes (Badia et al., 2013; Frank et al., 2004; Li & Choi, 2014; McKinney et al., 2015; Perrotta, 2013). Teachers consider student factors when making instructional decisions

(Kohler et al., 2008; Parmigiani, 2012; Shinas & Steckel, 2017). The literature identifies school leaders as integral in influencing the culture of a school (Şahin, 2011; Turan & Bektaş, 2013). Cooperative and collaborative school environments show positive results in teachers' technology beliefs (Bradley-Levine et al., 2014; Kelley et al., 2005; McKinney et al., 2015). Teachers' perceptions regarding the efficacy of technology can play an important role in decisions to integrate technology (Demir, 2008; Vannatta & Fordham, 2004).

As teachers consider how to incorporate technology in their classroom, knowledge of existing barriers to technology integration is essential. Technology PDs that encourage collaboration and individualized learning opportunities may assist teachers in these integration efforts. Similarly, a positive school culture, a school leadership structure that supports technology experimentation, teachers' personal beliefs regarding the efficacy of technology, teachers' proficiency in classroom dynamics, pedagogical knowledge of the ways students learn, and the ability to select technology tools that will support students' learning all impact teachers' technology integration.

Chapter 3

Method

This chapter provides an overview of the blended learning cohort PD program with a thick description of the cohort sessions. Additionally, the study methodology includes an overview of the context, participants, measures, and procedures.

Context of the Study

The school division in which the case study took place implemented a yearlong technology-focused community of inquiry, called a blended learning cohort, in two middle schools. These communities of inquiry were structured to support teachers as they prepared to use blended learning techniques in classroom instruction. The blended learning cohort, sought to increase teachers' technology collaboration and their subsequent implementation of blended learning. The blended learning cohort structure provided participants with access to technology resources, time to experiment with and practice new technologies, and blended learning lesson planning opportunities.

The embedded format of the PD, which took place during the school day, was designed to provide teachers with sufficient time to make instructional technology decisions. Additionally, teachers were supported by technology integration specialists and blended learning coaches who worked with the teachers to implement blended learning in the classroom. Participation in the cohort was voluntary and cohort members were those individuals who both demonstrated a willingness to experiment with technology in addition to an aptitude for technology integration. Participation goals for the blended learning cohort were to help teachers experiment with blended learning techniques, to assist in the development of regular technology use practices, and to encourage teachers' technology leadership development.

School Division

The context for the study was the Applegate Valley Public School division (all names are pseudonyms), or district, located near a large metropolitan center on the East Coast. Applegate Valley Public Schools contains 18 schools, including two middle schools, two K-8 schools, one pre-K school, and a comprehensive high school with nearly 4,000 students across three separate campuses. The school division educates a diverse population of over 15,000 students from 134 countries who speak 113 languages. Applegate Valley Public Schools feature a diverse student population comprising 36.08% Hispanic, 28.46% Caucasian, 26.83% African American, 5.32% Asian, and 2.88% Multi-racial, 0.20% Native American, and 0.17% Native Hawaiian/Pacific Islander. Over 61% of students are eligible for free and reduced price meals.

Teachers in Applegate Valley Public Schools had smaller class sizes than surrounding school divisions, and teachers were not required to complete supplemental duties (e.g., lunch, bus, or hall supervision) as part of their instructional day. This schedule was due to the school division's commitment to instructional technology, a prioritization of smaller class sizes, and a belief that teachers should focus solely on instruction rather than on non-teaching related duties. All teachers in the school division were required to follow the division-provided curriculum in addition to the state-provided curriculum. The wealth of technology within the school division was evident in the significant student access to technology, such as 1:1 devices for all students in Grades 3–12. Students without Internet access at home could also check out portable Wi-Fi devices from their school or visit any of the various locations within the city that had been equipped with school division hotspots.

Two middle schools within Applegate Valley Public Schools provided the settings for this dissertation study: Sterling Creek Middle School (SCMS) and Valley View Middle School

(VVMS). Student enrollment and the number of teachers and administrators for each middle school are provided in Table 3.1.

Table 3.1

School Data 2017-2018

Description	SCMS	VVMS
Student Enrollment	1,400	1,300
Number of teachers	137	118
Number of administrators	9	7
Student: teacher ratio	1:11	1:10

All grade-level teachers at both SCMS and VVMS had common planning periods to aid in their ability to plan lessons collaboratively. This emphasis on uninterrupted planning time stemmed from a school division objective to support cohesion of instruction to better meet students' instructional needs and to encourage teachers' collaboration across content areas. Teachers and students were grouped into small student learning communities called teams (e.g., Grade 6-Team 1 or Grade 6-Team 2) so that all students on a team shared the same set of teachers.

Both middle schools featured open access to technology due to a 1:1 computing device initiative, a robust Wi-Fi network, the placement of two TISs per school, and an in-house technology helpdesk in each school. Given the wealth of technology and technology supports, the first-order barrier of technology access was not germane to the study context. Similarly, time as a barrier (Hsu, 2016; Wachira & Keengwe, 2011) was not observed in the case study contexts due to the common planning periods, small class sizes, and lack of teacher duty requirements.

Blended Learning Cohort Professional Development Program

A blended learning cohort PD program was implemented in Applegate Valley Public Schools during the 2016–2017 school year. During the 2015–2016 school year, the school

division hired a new chief academic officer to head the curriculum and instruction department. To better understand curriculum and instruction needs, an outside consulting firm was hired to complete an audit of the school division's curriculum. After conducting teacher and student focus groups and surveys, the consulting firm noted a lack of 21st century technology skills and innovation in the school division curriculum. This finding led to intentional technology collaboration between the chief academic officer and chief technology officer to develop a technology PD program that supported teachers' technology knowledge while ensuring that teachers' technology practices supported the pedagogical goals of the curriculum and instruction department.

The school division established a blended learning cohort model as a result of this interdepartmental collaboration. The PD initiative established blended learning cohorts at the elementary, middle, and high school levels for teachers to experiment with blended learning while extending their technology knowledge and supporting their technology collaboration and integration of blended learning. The school division's blended learning cohort had three goals: (1) support teachers in a shift to blended learning, (2) provide teachers with peer collaboration opportunities, and (3) foster future technology innovation and technology leadership.

The PD sessions featured blended learning examples and included blended learning in the delivery format by offering face-to-face, asynchronous, and synchronous opportunities to model blended learning (see Appendix A). Cohort meetings used web conferencing software and were recorded using Blackboard Collaborate to accommodate teachers who were unable to physically attend sessions conducted during the school day. Hosting the cohort meetings via Blackboard Collaborate allowed for the creation of online video presentations that teachers were able to review at their leisure. Cohort facilitators, hired by the school division to support the shift to

blended learning, used Blackboard's tracking statistics to monitor the teachers' viewing history. The virtual option allowed teachers without common planning periods to participate in the cohort experience.

In August 2016, the school division held an inaugural blended learning camp and introduced the blended learning cohorts. The purpose of this camp was to present teachers with a variety of blended learning models and practices that could be integrated in their respective content areas and grade levels. The instructional practices showcased at the blended learning camp also aligned with the school division's objective to support teachers' technology PD in collaboration with curriculum and instruction aims. In September 2016, details regarding blended learning cohort teacher participation were discussed with SCMS and VVMS administrators. Administrators and TISs at each school nominated teachers to participate, based upon perceived technology aptitude and technology leadership. First-year teachers were excluded from nomination, owing to their extensive PD requirements as novice teachers.

The theory of change diagram outlines participation in blended learning cohorts (see Figure 3.1). Through participation in blended learning cohorts, cohort members were provided the opportunity to implement blended learning, collaborate with their peers, and to build teachers' capacity for technology innovation and technology leadership. Teachers were introduced to the four blended learning models: rotation model, flex model, self-blend model, and enriched-virtual model (Staker & Horn, 2012) and given opportunities to decide which model or models would best fit their instructional goals. Participants were encouraged to engage in lesson planning with their peers and TISs to determine which blended learning model or models could best support the learning objectives of the particular lesson. Cohort facilitators gave participants examples of the most appropriate use for each blended learning model and time

was provided for participants to talk with each other and with TISs. Participants were encouraged to follow up with their TIS to plan blended learning lessons prior to implementation in the instructional setting.

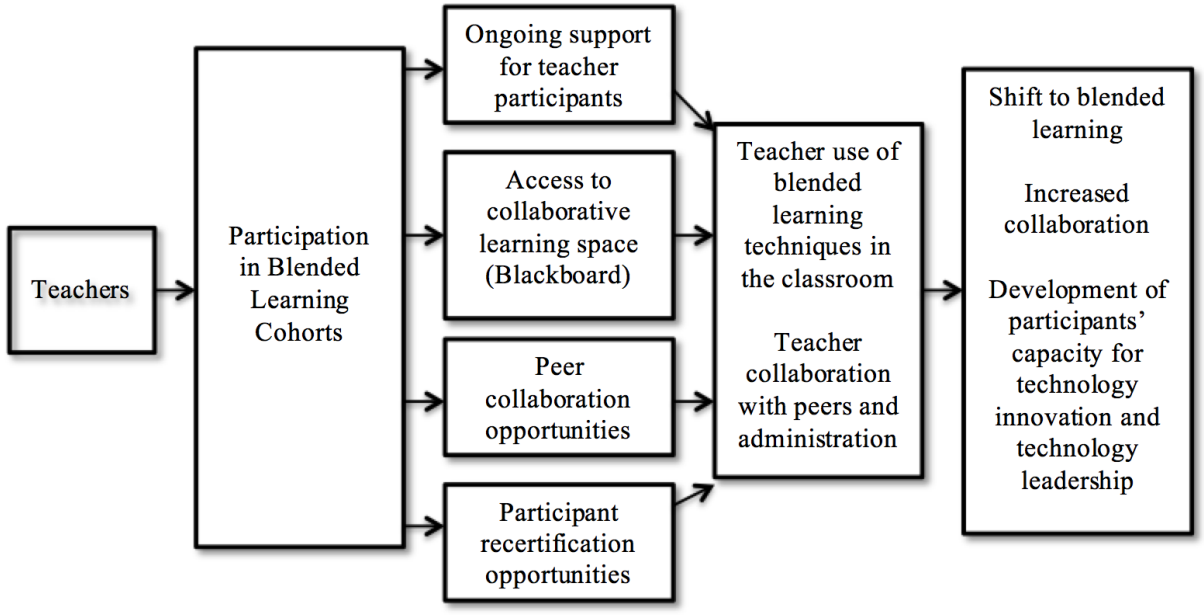

Figure 3.1. Theory of change diagram. This figure indicates the blended learning cohort theory of change as structured by the school division.

The school division supported time for TISs and blended learning coaches, both of whom facilitated the blended learning sessions, to work closely together to develop instructional methods and cohort expectations when developing the blended learning cohort instruction. This work entailed monthly online calls with the TIS and blended learning coaches to prepare for each cohort meeting and to strategize methods for sustaining participant engagement. The TIS and blended learning coaches also met regularly with division curriculum leadership and technology services departments to ensure that cohort goals were being met. The monthly meetings began in September of 2016 and culminated in May of 2017, for a total of nine sessions. The cohort meetings took place via face-to-face and web conferencing to model blended learning. In addition to modeling blended learning, cohort members were also introduced to web-based

technology tools such as Twitter, VoiceThread, Today's Meet, and Padlet. All cohort members were enrolled in an online classroom in the Blackboard learning management system to gain access to course materials (e.g., discussion board, blogs, wikis, toolkit, success center).

The TISs and the blended learning coaches worked closely with cohort members to help ensure the incorporation of blended learning practices. Additionally, cohort facilitators co-developed levels of involvement required for cohort members to receive recertification points. The recertification points were designed as an incentive to ensure that teachers remained active participants throughout the year. During the first cohort meeting, all teachers received the recertification matrix (see Appendix B). Each cohort member selected cohort activities to complete. These cohort activities were aligned with recertification points and teachers worked closely with the TISs to create a personalized learning timeline.

Typical cohort meetings consisted of a 60-minute synchronous video discussion in which cohort members and cohort facilitators discussed successes and challenges in the month between meetings. Each meeting began with a goal update during which teachers shared their progress toward achieving individually-set goals related to cohort participation. During the first iteration of the blended learning cohort, goals were decidedly informal in nature and designed to encourage teachers' technology experimentation efforts. The TIS and blended learning coaches met individually with cohort members to assist in goal setting and encouraged teachers to attempt a minimum of one blended learning lesson during each month. Following goal updates, cohort members shared potential lessons they planned to teach to support blended learning. Cohort members were also introduced to various technology tools that could be used to support blended learning. During meetings, cohort members engaged in book discussion about *Blended Learning in Grades 4–12* by Tucker (2012). The first four cohort meetings focused on members

gaining a better understanding of blended learning by participating in guided reading discussions, having conversations regarding potential blended learning lessons, and examining blended learning lessons implemented by other teachers and in other school divisions. The remaining five meetings were designed to support the implementation of blended learning using the skills, knowledge, and resources discussed in the first four meetings. Two of the cohort sessions were held face-to-face and seven synchronous sessions were held using web conferencing software (see Appendix A).

Session 1. In the synchronous September session, teachers examined the iNACOL blended learning teacher competency framework (Powell et al., 2014), crafted a school division specific definition of blended learning, and began reading *Blended Learning in Grades 4–12* (Tucker, 2012). Cohort members spent time examining the iNACOL blended learning teacher competency framework during this first session to allow the framework to guide their subsequent blended learning lessons. The iNACOL framework was selected because it is internationally renowned and the TIS and blended learning coaches were familiar with the framework. The September session concluded with members selecting one blended learning action to attempt before the next cohort meeting and sharing their plan with a fellow cohort member.

Session 2. During the synchronous October session, cohort members engaged in dialogue related to the first two chapters of Tucker's (2012) book, discussed the blended learning being done in other school divisions, established individual cohort goals, and learned how Twitter and Padlet could be used in blended learning lessons. The session began with a conversation about the action items teachers decided to attempt at the last meeting. Teachers shared successes, challenges, and obstacles encountered while trying their blended learning action. The study of Tucker's (2012) book examined Chapters 1 and 2, which focused on student-centered learning,

collaboration and communication, teacher-designed blended learning, the benefits of blended learning, and how to establish a community of inquiry to support blended instruction. The guided discussion asked teachers to consider the ways in which they currently teach the concepts of collaboration and communication; how they use the physical space in their classrooms; how they may approach a blended learning model; fears they may have regarding using a blended approach to instruction; how teachers may articulate their decision to employ blended learning; and possible educational and teaching benefits that they perceive when adopting a blended learning model.

Following the book study discussion, teachers briefly examined blended learning in other schools to better understand the opportunities afforded through blended instruction. The cohort members discussed individual goals related to their cohort participation. For example, one teacher's goal was to teach three blended learning lessons over the course of the school year. Teachers also learned how Twitter and Padlet could be used to extend student learning outside the classroom and generate opportunities for student interaction. The purpose of the introduction of technology tools was to provide an overview of the applicability and functionality of various tools that could be used to enhance blended learning lessons. Lastly, teachers were asked to read the third chapter of Tucker's (2012) book prior to the next session and encouraged to select a new blended learning action goal to attempt before the next cohort session.

Session 3. In the face-to-face November session, teachers learned about the master teacher project, a lesson plan sharing resource site, and continued reading and discussing the third chapter of Tucker's (2012) book. The November session afforded teachers, TISs, and blended learning coaches the opportunity to meet in person on a division-wide professional learning day. During this time, teachers met in subject area groupings (e.g., Mathematics,

Science), facilitated by the TIS and blended learning coaches, to share their blended learning implementation efforts and to continue their book study.

Chapter 3 of Tucker's (2012) book discussed the role of the blended learning teacher as facilitator. Cohort members shared their own facilitation style, conversed regarding their role as a silent facilitator or involved facilitator, and considered the benefits to each facilitator role. Teachers also discussed ways in which they could differentiate during online discussions and how to best manage students' workflow by returning assignments to students via online platforms. A conversation concerning teachers' current approaches to differentiation of instruction led to a discussion about how teachers might differentiate this instruction as they began to blend course lessons.

Session 4. The synchronous December session introduced teachers to VoiceThread and Today's Meet, two technology tools that could be used to support blended learning instruction. The session opened with teachers having time to share with each other regarding their individual progress toward their selected blended learning action item from the prior month. The bulk of this session was designed for blended learning lesson planning. Teachers brainstormed and worked with each other, and with the TIS and blended learning coaches as desired, to develop a blended learning lesson by modifying an existing lesson.

As part of the blended learning lesson creation portion, teachers were introduced to VoiceThread, which is a collaborative web tool. With VoiceThread, teachers and students are able to create presentations, digitally comment on these presentations, and share presentations with a larger audience as desired. The school division purchased VoiceThread educational licenses for all students in Grades 6–12, and teachers were eager to use a division-approved technology tool. Teachers were also introduced to Today's Meet, a digital collaborative

discussion web tool. Today's Meet allows teachers and students to engage in educational conversations that extend outside the classroom walls. Through use of a unique classroom code, students can access the teacher-created virtual classroom and comment to their peers and to the teacher in this environment. The final monthly task asked each teacher to select a specific technology tool that they would use as part of a lesson before the January cohort meeting.

Session 5. The synchronous January session began with teachers sharing an update regarding their success with the technology tool they had decided to try during the last cohort session. Teachers also completed a six-question midyear cohort satisfaction survey in which they were asked to share their thoughts on the cohort format, any suggested formatting changes, the aspects of the format that were working for them, and their needs going forward. This was followed by a discussion of Chapters 4 and 5 of Tucker's (2012) book, with specific attention given to the design of quality questions to encourage student participation.

Within the discussion, teachers explored how to generate engaging questions that would promote the development of students' higher-level thinking skills and sustain their attention in an online forum. The discussion also included the ways in which teachers could establish clear expectations for students' online participation while working to create safe online communities for students. Finally, teachers again selected an individual blended learning goal that they would work toward during the next month.

Session 6. In February's face-to-face session, teachers learned about specific blended learning models and discussed Chapters 6–9 in Tucker's (2012) related to technology resources. The focus of this cohort session was to move teachers from the learning phase to the implementation phase. As the February cohort session occurred face-to-face, the book discussion of blended learning resources took place via Blackboard discussion board prior to the face-to-

face meeting. To extend the conversation, teachers shared blended learning resources with each other during the face-to-face meeting and worked with the TIS, blended learning coaches, and each other to incorporate the resources within a blended learning lesson. When planning the lesson, teachers selected the blended learning model, including rotation, flex, self-blend, or enriched-virtual (Staker & Horn, 2012), that would best align with their chosen PD learning goals. Teachers closed out the cohort meeting by developing a goal for the blended learning lesson they began planning during the February cohort session. The February cohort meeting ended with teachers being asked to bring a blended learning research article to share with the cohort for the March session.

Session 7. The March synchronous session began with teachers providing an update related to their individual challenges or successes with their blended learning lesson. The update was followed by an examination of blended learning research provided by the blended learning coaches. This research included journal articles and examples of blended learning in use in other schools and school districts. To help compile a cohort research catalogue, teachers contributed the research article they had brought to the cohort meeting. The blended learning materials provided by the blended learning coaches contained links to resources as well as tips and tools for teachers to try in their classrooms. The cohort meeting ended with teachers setting personal goals for blended learning implementation within the month of March.

Session 8. The synchronous April session focused on providing teachers with structured time to ask questions of each other, the TIS, and the blended learning coaches regarding blended learning lessons they had attempted or were planning to attempt. Teachers discussed the facets of implementing blended learning that had been easiest to adopt and any aspects that remained challenging. Additionally, the blended learning coaches shared blended learning exemplars and

asked teachers to consider strategies or techniques they may wish to adapt for use in their blended learning lessons. The April session concluded with teachers brainstorming with their peers, TISs, and blended learning coaches to develop individual blended learning goals for the month of April.

Session 9. The final synchronous session in May promoted teacher discussion about blended learning networking as well as the technology resources available on two technology websites: KathySchrock.net and Cybraryman.com. The focus of the session was exploring blended networking and facilitating a discussion regarding how teachers would carry blended learning forward. The session opened with teachers communicating updates on the progress of their blended learning goals over the course of the cohort experience and their future blended learning goals. During this session teachers also shared particular challenges to implementation and obstacles they encountered over the course of their cohort experience. The blended learning coaches shared a variety of social networking professional learning opportunities for teachers to continue to hone their blended learning practice after the cohort ended. The final session closed with the teachers setting goals for blended learning implementation during the 2017–2018 school year and sharing these goals with their colleagues.

Purpose of the Study

A descriptive case study design (Yin, 2003) was used to consider the ways in which teachers implemented blended learning following a blended learning cohort PD program. The following research questions guided the dissertation study (see Appendix C):

1. What are teachers' perceptions of changes in attitudes and beliefs about instructional practices after a blended learning professional development program?

2. How do teachers implement blended learning after a blended learning professional development program?
3. What are teachers' decision-making processes when implementing blended learning after a blended learning professional development program?

Research Design

A case study can include quantitative data, qualitative data, or mixed methods techniques and is used when a researcher seeks to explain, describe, illustrate, or explore a particular phenomenon or study context in great depth (Yin, 2003). For this study, I relied primarily on methods described by Yin (2003, 2009), who has written extensively regarding case study research. A case study "presents a detailed account of the phenomenon under study . . . with the intent of interpreting or theorizing about the phenomenon" (Merriam, 1988, p. 28). Case studies are appropriate when conducting a detailed investigation within a context (Yin, 2009) and an effective case study is one that uses an in-depth examination of a program, experience, endeavor, process, or one or more individuals (Stake, 1995).

Case study methodology is best used when there is no need to control behavioral events and when the study is focused on contemporary actions rather than historical issues (Yin, 2003). A qualitative study allows a researcher to explore phenomena such as emotions or thought processes that are difficult to obtain or learn about through quantitative research methods (Strauss & Corbin, 1998). A descriptive case study seeks to record the procedures of a particular event or events (Yin, 1981). As the study considered teachers perceptions and decision-making processes, in addition to their individual blended learning implementation, a qualitative descriptive case study design was selected to help best understand the complex issues related to the unit of analysis of the study: teachers.

Method

This section will describe the study participants and procedure. A summary matrix, which shows the alignment between research questions, constructs, data collection, and data analysis, is presented in Appendix C.

Participants

A total of 13 participants (all names are pseudonyms) who had participated in the blended learning cohort during the prior school year were eligible to participate in the individual interview and nine educators agreed to be interviewed. These individuals were all female educators and taught diverse subjects (see Table 3.2).

Table 3.2

Participant Demographic Characteristics

Teacher	Gender	Years Taught	Subject(s) Taught
Alice	F	3	Science
Julianne	F	20	Social Studies
Becka	F	9	Science
Gwen	F	14	Social Studies
Janice	F	6	Language Arts
Koko	F	27	Library Science
Mary	F	11	Special Education, English Language Learners, and Language Arts
Sarah	F	23	English Language Learners and Science
Sylvia	F	10	Science

Three teachers were selected for case study inclusion. The teaching experience of the case study participants ranged between 3 to 20 years and participants had taught within the school division for a minimum of 3 years at the time of study participation. Case study participants all taught core subject areas at the sixth-grade level. Individuals who did not provide direct instruction in the classroom setting were excluded from study participation. All case study participants had attained a master's degree (see Table 3.3).

Table 3.3

Case Study Participant Demographic Characteristics

Teacher	Gender	School	Years of Experience	Years at Current School	Subject(s) Taught
Alice	F	SCMS	3	3	Science
Julianne	F	VVMS	20	3	Social Studies
Mary	F	VVMS	11	6	Language Arts for Special Education and English Language Learners

Alice taught at SCMS and Julianne and Mary taught at VVMS. Both middle schools were in the second year of a 1:1 initiative and featured technology-rich environments. Only one of the three case study participants was required to prepare students for state testing; the other two taught non-tested subject areas. All three participants expressed interest in furthering their technology knowledge through cohort participation and stated in the individual interview that they had regularly implemented blended learning in the classroom since completing the cohort.

Alice. Alice taught sixth-grade science at SCMS. Alice was the youngest teacher in the case study with her 3 years of teaching experience all at SCMS. An avid technology user, Alice's goal was to leverage technology to make real-world connections for her students: "I love technology and wanted to be that support for my team and for my students" (First Case Study Interview). Alice participated regularly in technology PD opportunities in the school division and presented at blended learning camp during her second year of teaching following her blended learning cohort participation. She also was accepted to participate in the yearlong technology leadership project led by school division TISs during the 2017-2018 school year. During case study participation, Alice's interviews reflected a different reality than what was observed in her classroom. Although Alice was enthusiastic about the benefits of blended learning for her students and used a variety of technology tools, her classroom management did not allow for

sustained, coherent technology instruction. Much of the instructional time was spent with Alice managing student behaviors such as students talking out of turn, and class disruptions, which left less time for the implementation of blended learning.

Alice was one of the youngest members of her department and stated that she first decided to use technology due to her age respective to other members of her department. “I think older people, not just teachers, are less likely to embrace new technology” (Second Case Study Interview). Alice reported that she felt that education was moving toward increased technology use and it was important to her to ensure that her students were prepared for that learning environment. Alice felt uniquely suited to prepare her students for post-secondary pursuits given her own perceived technology skills. “I’m definitely top five in the building on the dangers and uses of technology” (First Case Study Interview). Alice’s use of technology in her personal life motivated her to incorporate technology into her classroom instruction. Having always been a “fan of technology,” Alice was eager to discover how technology could improve her teaching (First Case Study Interview). Alice was also inspired to participate in the blended learning cohort due to the fact that her school was transitioning to a 1:1 environment at the same time. “Since my school is 1:1 technology, that made it real easy to continue using blended learning and using the cohort gave me better tools” (First Case Study Interview). Alice was primarily observed using the stations model when implementing blended learning. Although she was seen attempting to incorporate the flex model, frequent redirection of student behavior rendered implementing this model challenging for Alice.

Julianne. Julianne taught sixth-grade social studies at VVMS and had 20 years of teaching experience, including 3 years at VVMS. Julianne recognized the value of instructional technology and wanted to continue her own learning: “I have seen teachers that are so

uncomfortable with the technology in the building that they are almost paralyzed with fear to even try. And I think I don't want to be that way" (First Case Study Interview). She had expanded her technology knowledge through consistent participation in division-offered PD opportunities including the blended learning cohort and the technology leadership project. Julianne operated a well-structured, efficient, and organized classroom in which student behavior was not an issue. Students were well aware of classroom procedures and Julianne served as a classroom facilitator, rather than as the sole arbitrator of knowledge. When students asked for assistance, Julianne pushed them to first consider how they could determine the answer or directed students to where they might locate the answer rather than providing the answer. Possibly due to established classroom procedures, Julianne's students seemed more autonomous than the students of the other three case study participants and exhibited greater collaboration during classroom observations.

Julianne was very interested in using technology to enhance her students' learning and worked to find new ways to increase her students' engagement in learning. For Julianne, blended learning provided a broader understanding of history for her students. Julianne stated that she feared that she was growing older and not keeping up with innovations and technology offered her a way to keep up with her peers and with her students. "I feared that I was growing older and not keeping up" (First Case Study Interview). Julianne's decisions to implement blended learning stemmed from her enrollment in a division-offered, yearlong technology PD called the Teacher Leadership Project. Her participation in this PD encouraged her to try blended learning after she saw colleagues using blended learning in their instruction. Similar to Alice, the middle school transition to a 1:1 environment, which occurred in the same school year as the blended learning cohort, was a driver of Julianne's decision to join the cohort and her experimentation

with blended learning. “What really kind of prompted my sudden interest . . . was because we were getting the Chromebooks and I wanted to make sure I could effectively use those tools” (First Case Study Interview, 2018). Julianne’s blended learning implementation consisted of the stations model and a modified flex model in which she provided in classroom support for students as they worked with online content.

Mary. Mary taught in the special education department at VVMS and also co-taught with VVMS language arts teachers. Mary had a total of 11 years of teaching experience at the time of the case study, six of which had taken place at VVMS. In contrast to Julianne’s students, Mary’s students required the most teacher direction, possibly because many of her students were dually identified as both English language learners and students with special needs. Her dually-identified students required frequent monitoring from Mary to ensure student mastery of the lesson content. Mary seemed resigned to the influx of instructional technology stating, “I use technology in my personal life and I think it’s something that’s happening. It’s 21st century learning and that’s what the kids are growing up with, and whether or not we like it, we have to use it” (Individual Interview). When Mary implemented blended learning with her students, she had the most success when using the stations model because she was able to group students according to their individual needs and provide specific support to those stations needing more one-on-one instruction.

Mary’s students were required to take the end-of-year standardized assessment in the area of reading, which she felt required her to spend much of her instructional time focused on preparing students for this exam.

> I will continue with what I’m doing [with blended learning]. We’re meeting about our 45-day plan, which is heavily focused on [state testing] prep, so that changes how we are

> doing things in the classroom and would impact what I would be doing until after the [specific state exam]. (Individual Interview)

As a special education teacher, Mary shared that she felt blended learning made her students more independent and allowed her to better differentiate instruction according to the diverse knowledge levels of her students. Similar to Alice, Mary's use of technology in her personal life encouraged her to participate in the blended learning cohort. "I enjoy using it and it's something that I think I'm fairly good at so I like to practice using it with [the students]" (First Case Study Interview). Mary also felt that the blended learning exposure she received in technology PD sessions urged her to push herself. "I got to see the benefits and I just felt like it was time for me to try a new approach. And it just made sense because blended learning was on the rise in our school" (First Case Study Interview). Mary's blended learning implementation consisted of the stations model during all classroom observations.

Measures

The data sources for this study included: a semistructured individual interview, two semistructured case study interviews, face-to-face classroom observations, online classroom observations, and a researcher's journal.

Individual interviews. Each member of the cohort was invited to participate in a semistructured individual interview containing 15 questions (see Appendix F). Individual interviews were constructed to obtain teachers' instructional technology backgrounds and perceptions regarding cohort activities and experiences that supported the implementation of blended learning. Additionally, participants were asked to reflect on the design of the cohort structure as an effective means of technology PD. One question inquiring about the perceived effectiveness of the cohort model asked respondents, "Which blended learning cohort activities

did you find effective in helping you to implement blended learning?" Another question asked, "How did the format of the blended learning cohort help you implement blended learning?"

Case study interviews. In addition to the individual interview, case study participants took part in two semistructured case study interviews that examined participants' technology knowledge, changes in collaborative teaching practices, experiences participating in the blended learning cohort, and changes in blended learning resulting from participation in the blended learning cohort. Responses from all interviews helped understand the constructs of collaboration and blended learning.

***Initial case study interviews*.** The initial case study interview contained 19 questions to provide opportunities for participants to share their experiences in explanatory detail (Stake, 1995; see Appendix G). An example of a question related to blended learning was "What does blended learning look like in your classroom?" An example of a question related to teacher decision making was "When implementing blended learning, how do you decide which technology tool to use?" An example of a question related to school factors that impact teachers' decision making was "What do you perceive as your school administration's stance on the effectiveness of blended learning implementation?"

Follow-up case study interviews. The follow-up case study interview sought to better understand the ways in which teachers implemented blended learning following participation in the blended learning cohort PD program. During the follow-up case study interview, participants were asked to elaborate on statements made during their individual interviews and initial case study interviews and to discuss instructional practices seen during classroom observations. The content of the follow-up case study interviews for Alice, (see Appendix H), Julianne (see Appendix I), and Mary (see Appendix J) had commonalities, but were unique to each participant.

Classroom observations. The study included unannounced observations of each case study teachers' face-to-face and online (i.e., virtual) classrooms. The unannounced face-to-face and online classroom observations helped to understand the ways in which teachers applied their knowledge of blended learning to their pedagogical instructional practices related to blended learning.

Face-to-face classroom observation protocol. Four face-to-face classroom observations were conducted for each case study participant to witness participants' implementation of blended learning practices in their classroom instruction. Open field notes were used for the classroom observations and observations were based on iNACOL's blended learning teacher competency framework (Powell et al., 2014; see Appendix K).

Online classroom observation protocol. The online classroom observation protocol featured six iNACOL blended learning teacher competencies that showcased use of online collaboration and communication, utilization of a variety of blended learning tools, as well as a variety of technology options for students (Powell et al., 2014; see Appendix L). Specifically, I selected iNACOL Domain 1, Competency 1, Standard C, which advocates for a learning environment that is flexible and personalized to individual students. iNACOL Domain 3, Competency 3, Standard A encourages a connection to sources of information that extended learning beyond the classroom teacher and textbook. iNACOL Domain 3, Competency 3, Standard B supports the creation and preservation of open lines of communication with students, educators, and additional stakeholders in an effort to encourage student learning. iNACOL Domain 4, Competency 2, Standard A urges the use of a variety of resources to support students' content knowledge acquisition. iNACOL Domain 4, Competency 4, Standard A suggests that the use of online collaborative tools to arrange and administer a blended learning setting can be

beneficial. iNACOL Domain 4, Competency 2, Standard B states that an assortment of blended learning technology tools, approaches, and resources for students is ideal. These particular competencies were selected based upon their focus on student learning as a goal when implementing blended learning.

Researcher's journal. A researcher's journal was kept for the duration of the study as a place to take field notes, maintain coding logs, and document participant communications. Researchers must be subjective (Krieger, 1985) and keeping detailed notes concerning participant interactions can help demonstrate this impartiality. Insider knowledge can result in the researcher having the advantage of access to participants (Taylor, 2011). Therefore, it was necessary to meticulously record interactions as a method for examining researcher biases. The researcher's journal helped to establish an audit trail (Brantlinger, Jimenez, Klingner, Pugach, & Richardson, 2005).

Procedure

This section describes participant selection for the individual interview and the case study. Additionally, data collection and data analysis procedures for the interviews, classroom observations, and researcher's journal are discussed.

Participant Selection

In September 2016, 16 sixth-grade educators from SCMS and VVMS were selected to participate in the blended learning cohort PD program. Following completion of the cohort, three of the cohort members left the school division. The study participants were selected from the six SCHS and seven VVMS educators that completed the blended learning cohort PD program and remained in the school division. I emailed all 13 potential participants to discuss the goals of the current study and to provide them with the letter of informed consent for the individual interview

(see Appendix D). All 13 cohort members were invited to participate in the individual interview and given an opportunity to ask any clarifying questions regarding study procedures; nine agreed to participate.

Case study participants were purposively sampled for extreme cases based on analysis of the individual interviews. Purposive sampling of extreme cases seeks to include individuals who are particularly successful in implementing reform practices (Flick, 2009). Given that the data obtained were used for a descriptive case study, purposive sampling is sufficient to meet the needs of the current study (Wholey, Hatry, & Newcomer, 2010). Teachers that self-disclosed limited PD participation during the individual interview were excluded as potential case study participants, as they were not likely to provide sufficient data to respond to the research questions. Individuals who had left the classroom after their cohort experience, although they remained in the school division, were also excluded from case study participation. I met with all potential case study participants to offer an overview of the case study methodology, to offer a forum to address any participant questions, and to provide a second letter of consent specific to case study participation (see Appendix E). Four teachers were selected for case study inclusion and all four agreed to participate. Due to a family emergency that required a prolonged leave of absence from work, the fourth participant was unable to complete the case study. For this reason, her data were excluded from case study analysis. The remaining three participants all completed the case study.

Data Collection

Case study inquiry is successful when it is based on the collection and analysis of data from multiple sources (Yin, 2003). The examination of multiple data sources to ensure triangulation of data is essential when conducting a case study (Stake, 1995; Yin, 2009). Data for

this case study were collected via semistructured interviews, classroom observations, and a researcher's journal (see Table 3.4). Data collection began in February 2018, 7 months after the blended learning cohorts concluded.

Table 3.4

Data Collection Timeline

Instrument	Month(s) collected
Individual interviews	February 2018–March 2018
Case study interviews	March 2018–June 2018
Classroom observations	April 2018–June 2018
Researcher's journal	January 2018–June 2018

Individual interviews. The researcher conducted a post-PD semistructured interview with each participant between February 2018 and March 2018. The individual interviews were all conducted at the participants' school, at a time and location that was convenient for each educator (e.g., planning period, before school, or after school). Each individual interview lasted approximately 30 minutes. In addition to researcher notetaking during the interviews, participant responses were audiorecorded with a digital recording device, securely uploaded to a password protected Google Drive account on a password protected computer, and transcribed verbatim.

Case study interviews. The researcher conducted two semistructured interviews with each case study participant between April 2018 and June 2018. In addition to researcher notetaking during the interviews, participant responses were audiorecorded with a digital recording device, securely uploaded to a password protected Google Drive account on a password protected computer, and transcribed verbatim.

Initial case study interviews. The initial case study interviews occurred in March 2018 and April 2018 after the individual interviews were coded and after the first two face-to-face and online classroom observations were completed. The initial case study interviews were conducted

at the participants' schools at a time and location that was convenient for each teacher. Each interview lasted approximately 60 minutes.

Follow-up case study interviews. The follow-up case study interviews took place in June 2018 after the initial case study interviews and two face-to-face and virtual classroom observations were conducted and analyzed. The follow-up case study interviews were conducted at the participants' schools at a time and location that was convenient for each teacher. Each interview lasted approximately 30–45 minutes as the types of questions varied for each participant.

Classroom observations. Face-to-face and online classroom observations were conducted with all case study participants between April 2018 and June 2018.

Face-to-face classroom observations. Four face-to-face observations were conducted during mutually agreed upon class periods. The specific day of the observation was unannounced, however, to provide the best opportunity to observe teachers' authentic blended learning implementation. The duration of each classroom observation was approximately 50 minutes.

Online classroom observations. Online classroom observations were conducted using auditor status in the Google Classroom learning management systems, which allowed for the capture of teachers' asynchronous communications and interactions with students. The auditor status allowed for the observation of teacher-developed lessons, teacher-to-student and student-to-student communications, and documentation of these interactions by taking screenshots and viewing and downloading of online classroom discussions and student activities and assignments. Each online observation took place the day before the unannounced classroom observation. After taking a screen shot, I described the screen shot and indicated the relevant

section of the online course (e.g., shows a variety of resources for students to learn content). Additionally, I took detailed notes based on the iNACOL competencies (see Appendix L) regarding the stated or implied purpose of the relevant section and how the relevant section furthered understanding of teachers' technology knowledge and blended learning implementation.

Researcher's journal. A researcher's journal containing a contact log with participants, researcher reflections, and highly detailed field notes from interviews and classroom observations was maintained for the duration of the study. Journal entries were written and collected via Microsoft Word and then synchronized to a password-protected Google Drive account on a password-protected computer. Additional notes were taken in a notepad that was stored in a locked filing cabinet in the researcher's locked office.

Data Analysis

All data sources (i.e., interviews, observations, researcher's journal) were analyzed using Braun and Clarke's (2006) steps for thematic analysis: familiarizing oneself with the data, developing initial codes, searching for themes, reviewing the themes, defining and specifying themes, and generating the final report. First, I familiarized myself with the data by reading through it several times to explore recurring patterns. During this initial phase, I took copious notes that I revisited in subsequent phases. The second phase entailed generating the initial codes through careful consideration of noteworthy details. During this phase, I highlighted aspects of the data that could be key when considering the research questions. The third phase consisted of searching for themes within the targeted data and considering the ways in which these themes were substantiated by the data. After searching for themes, the fourth phase necessitated a methodical definition of these themes and the development of a written process that clarified

how the themes fit into the larger description. Finally, I generated the data analysis report in which I explained the data connections.

Given that initial data helped inform subsequent data collection, the order of data analysis was pertinent. First, the individual interviews were transcribed verbatim and analyzed to aid in the selection of case study participants. Second, case study participants' initial semistructured case study interviews and face-to-face and online classroom observations were analyzed concurrently to aid in the development of follow-up case study interview questions specific to each participant's prior interview statement and classroom observations. Finally, the follow-up case study interviews were analyzed. All data were analyzed per Braun and Clarke's (2006) theoretical thematic analysis approach.

Theoretical thematic analysis (Braun & Clarke, 2006) was used to code for specific constructs within each research question, such as teacher attitudes and beliefs, teacher decision making, and blended learning implementation. Therefore, the initial codes that were developed included decision making, teacher attitudes and beliefs, and blended learning implementation. Theoretical thematic analysis, as described by Braun and Clarke (2006), is driven by the researcher's theoretical interest in the topic, which results in a more researcher-driven approach. Though data are described, the description is generally less rich, with a more detailed analysis of some specific facets of the data. As coding occurred, themes were developed that related to the original research questions, which aligns with theoretical thematic analysis.

Trustworthiness and Credibility

Qualitative research consists of the researcher taking a committed role in the collection and interpretation of data (Stake, 1995). To be credible, qualitative researchers must be trustworthy and learn to consider their research as their participants do, rather than force their

own suppositions (Stake, 1995). To increase the trustworthiness and credibility of my findings, I used various techniques recommended by qualitative researchers.

Credibility

I took several steps to diminish threats to credibility. I examined several sources of data to substantiate findings via triangulation (Merriam, 2002; Stake, 1995; Yin, 2009). I conducted peer debriefs (Brantlinger et al., 2005) by asking the TISs in both schools to read the semistructured interview questions prior to dissemination to participants. I conducted member checks by providing participants with their interview transcriptions and requesting that they verify document accuracy (Brantlinger et al., 2005; Merriam, 2002). Additionally, I established an audit trail (Brantlinger et al., 2005) through thick descriptions of data collection processes and methods of analysis.

Triangulation of data (Merriam, 2002; Stake, 1995; Yin, 2009) occurred via careful examination of semistructured interviews, face-to-face and online classroom observations, and the researchers' journal. Credibility was supported through the establishment of an audit trail, peer debriefs, and member checks (Brantlinger et al., 2005). An audit trail was compiled to demonstrate that satisfactory time was spent in the field to assert valid results. Peer debriefs were used as a method for providing critical feedback and consisted of my dissertation chair reviewing the analyses and interpretations of the data and offering critical commentary. I also employed member checks by providing interview transcripts to the participants so they could review the content and intent (Creswell, 2009).

Dependability, Transferability, and Confirmability

Confirmability seeks to ensure the authenticity of data collection and study processes (Nastasi & Schensul, 2005). An audit trail helps establish confirmability by establishing a

comprehensive documentation of relevant study data and study procedures to allow possible duplication of the research study (Nastasi & Schensul, 2005). In addition to developing an audit trail, both my dissertation chair and co-chair provided regular feedback over the course of the study, during data collection, and during data analysis.

Dependability refers to "prolonged engagement with and persistent observations of the participants" (Tashakkori & Teddie, 2003, p. 37). Dependability was examined via a process of auditing (Flick, 2009). The maintenance of thick, descriptive field notes in the researcher's journal established an audit trail. Specific dates and times, in addition to detailed observation notes, served to "substantiate that sufficient time was spent in the field to claim dependable and confirmable results" (Brantlinger et al., 2005, p. 201). Data were systematically managed and securely maintained during the course of the dissertation study.

Transferability refers to the ability to transfer the study to settings beyond the existing research context (Flick, 2009). Specifically, transferability determines whether the study conclusions may be extrapolated beyond the particular situation of the study (Tashakkori & Teddie, 2003). I provided thick descriptions of the blended learning cohort PD program and rich descriptions of case study participants to support study transparency and transferability.

Researcher Subjectivity

The role of the qualitative researcher is that of a case investigator (Yin, 2009). Qualitative research presumes that the researcher's biases and values can influence study outcomes (Merriam, 1988). For the reader to assess the validity of any conclusions derived from data, the researcher must counteract his or her biases by stating them unequivocally to the fullest extent possible (Altheide & Johnson, 1994). It is necessary, therefore, to consider the ways in which my own biases, limitations, and views may have impacted the study. The following discussion will

outline my relevant personal experiences to minimize any unethical or unintended influences on my interpretation of technology integration, blended learning implementation, and collaboration.

My educational background is in social studies, administration, and instructional technology. I spent the first 10 years of my career as a classroom teacher, during which I served as the department chair as well as the schoolwide lead technology teacher. Next, I served as a TIS for 2.5 years, in the school division that was the setting for the dissertation study. My role was to support teachers' technology use in the classroom. For the past 4 years, I have served as the division's director of online learning and as the school principal of the non-traditional high school campus that uses blended learning techniques. My work as the director of online learning brings me into contact with school leaders, teachers, and students at both of the middle schools that were a part of this study.

My experiences as a classroom teacher, technology integration specialist, and school administrator motivated me to focus my research in the area of instructional technology and leadership. As the principal of our school division's blended learning campus, I have a vested interest in determining how teachers decide to implement blended learning following a blended learning cohort PD program and how the experiences of these teachers influence their instructional practices related to blended learning. My training as a TIS and a classroom evaluator could result in my increased awareness of appropriate classroom technology use to support student learning. I am trained to observe teacher practices to evaluate teacher effectiveness and I have experience in a blended learning classroom environment. I acknowledge that my expectations for what constitutes an effective teacher and an effective blended learning environment may be higher than the typical observer without TIS or administrative training.

Chapter 4

Findings and Discussion

This chapter will present the study findings. The findings from the cohort-level individual interviews will be discussed first, followed by the case study findings. The case study data sources included semistructured interviews, classroom observations, and screenshots of teachers' Google Classrooms. Findings will be framed using Clarke and Hollingsworth's (2002) interconnected model of professional growth. The discussion portion of the chapter summarizes the three cases, notes explicit connections between the findings and relevant literature, and concludes with study limitations, implications for practice, and suggestions for future research opportunities.

Cohort Findings

The individual interview featured nine participants who agreed to be interviewed during February and March of 2018. All nine individuals participated in the division-wide blended learning cohort during the 2016-2017 school year. Although two of the interviewees (Gwen and Sylvia) were no longer classroom teachers and one individual was a librarian (Koko), the nine members who agreed to participate afforded an understanding of their blended learning cohort experiences and how these educators subsequently implemented blended learning during the 2017-2018 school year. All nine participants were female, held master's degrees, and taught or supported core subjects (e.g., mathematics or social studies) at the time of cohort participation. The participants' years of educational experience ranged from 3 to 27 years. The semistructured individual interview allowed for an exploration of participants' views of the blended learning cohort and how participants had implemented what they had learned during their cohort participation.

Cohort Perceptions

Participants noted that the online format and asynchronous option of the cohort were beneficial, as this structure allowed members to view content at their leisure in the event that they had to miss a scheduled session. Becka said, “I missed a few sessions due to my schedule, so it was nice to be able to catch up at my convenience.” Koko agreed, saying, “I like having something available whenever the learner’s available.” Sarah also mentioned the benefits of the online format as she was not always able to attend the live sessions, but could “catch up later on my own. It brings the responsibility back to you.” Although Becka and Sarah both emphasized their ability to catch up on sessions on their own time, cohort sessions were scheduled and held during the teachers’ shared team planning periods specifically to accommodate teachers’ schedules and to ensure that all teachers would be able to attend in person as well as virtually. Not all teachers found the cohort format effective and some expressed frustration with ongoing technology issues that impeded active participation. Sylvia shared that the “technology was often going in and out. We couldn’t hear. One time, we just had to listen to this person who we couldn't see, and she couldn't see us because of things that were not working.” Julianne agreed,

> The format didn’t help. I think that the way they were trying to format the session, where they had a camera on . . . And it sometimes didn’t work, or the sound was strange, or you would just be staring at one person while somebody else was speaking . . . You might as well have just not had it. I mean, really it wasn’t beneficial. There was a person speaking, but I have a difficulty with listening to somebody without seeing them, personally. I find myself a little bit tuning out.

Though not all teachers regularly attended the cohort sessions, many interacted using the supplemental cohort resources in the Blackboard site. Of these resources, blogging and

discussion boards were reported as most popular, with participants speaking positively about reading how their colleagues were using blended learning and then considering how to adapt these ideas to their own classrooms. Janice stated, "Reading what others said was good because it gave me ideas for my classroom." Koko's strong writing skills meant that blogging was a valuable experience for her since "blogging was a great way of expressing myself." Mary also stated that she found blogging to be helpful, as it allowed her to "read those different pieces" and then "comment on them and get feedback." Mary also stated that it was nice to be "able to talk to my peers during the actual meeting."

Participants spoke favorably regarding the levels of support available during the blended learning cohort and the use of different technology tools to encourage differentiation. Alice specifically praised TIS support as being central to her use of blended learning in her classrooms, saying, "If I was having difficulty . . . my coworkers would inspire me to try new things and the TISs and the blended learning folks would support my implementation." The introduction of different technology tools in the cohort sessions was designed to give participants options for their own classrooms and to encourage technology experimentation. Julianne seemed to enter the cohort with an open mind and stated that she pushed herself to set a personal goal: "I like to see how I could integrate it [blended learning] into what I'm already doing. And I found myself going, 'I could do that. Oh, I could do that.' Every week I would force myself to try one new thing." Julianne also supported the "Use [of] a variety of different tools or it gets boring. People tune out." Koko echoed Julianne's statement, saying, "I think you've got to use a variety of different tools." The range of tools modeled by TISs and the blended learning consultants helped Koko consider how she could incorporate blended learning into library instruction for both students and staff.

Cohort Implementation

Following each PD session, teachers incorporated blended learning techniques into classroom instruction by applying concepts learned during participation in the PD. Implementation varied by teacher but blended learning consistently entailed teachers providing students with both face-to-face and online instruction. Some teachers extended learning outside the school day by asking students to watch videos on Nearpod, an interactive presentation and assessment tool, and report to class ready to discuss video content as a whole group. Other teachers provided online enrichment or remediation content on Google Classroom for students to complete outside of school hours. Sarah found it helpful to blend learning by having her English Language Learner students complete vocabulary lessons online and then reinforcing the vocabulary with in-class instruction. Mary preferred to group students in stations during class with certain stations devoted to Nearpod video instruction while other stations focused on skills practice. Becka provided an example of a lesson she had taught on circle graphs in which she introduced the topic by having students view a Khan video. She followed the video with a mini assessment to check for students' understanding and then grouped the students randomly to practice the new skill. Although Sylvia had left the classroom to serve as an instructional coach for science, she described the positive feedback she had received from her efforts to record mini lessons and PD sessions for teachers and house them in Google Classroom, allowing for flipped instruction.

This instructional shift was challenging for some participants who shared their initial hesitancy regarding the efficacy of blended learning but changed their minds when they began to see positive student outcomes such as student engagement. Mary admitted that she struggled with the concepts at first, but that she began to see the benefits of blended learning instruction

and incorporation once she observed her students becoming increasingly engaged in her lessons. She stated,

> I had a hard time with it [implementing blended learning] at first, because it's a lot of student-led, and as a special ed [education] teacher, letting them go by themselves [take control of their own learning] a lot was hard. By the end though, there were things that I think we started to do well, and it was student-led. So, my feelings changed throughout for the positive.

Teachers commented positively on the advantages of cohort participation and the benefits of blended learning on classroom instruction. Specifically, teachers shared that blended learning led to increased student engagement and increased opportunities for students to facilitate their own learning. With the application of cohort knowledge to classroom experiences teachers saw noticeable increases in student engagement, which in turn encouraged teachers to continue with blended learning instruction. Becka said, "With the students, I think it helped get them more interested in the lessons. We took what we learned in each session and brought that back to our classrooms and I've seen the students get excited." Janice commented that she wanted "to see if it [blended learning] keeps making a difference for student engagement. I know I've had less behavior concerns since students get to feel like they are in control, like they get to help decide what learning path they're taking." Sarah agreed, "It's not about what I believe, it's about how they learn, and empowering them to learn on their own. That's why I like blended [learning]." Sylvia stated, "It made me realize that there are options for how I teach students. I can do direct instruction, I can let students lead the learning." Koko began to "[see] more possibilities."

Participants also reported that collaborating with their peers encouraged them to experiment with blended learning in their classrooms by trying ideas they had learned from

peers. Sylvia said that “the collaboration was nice and we learned from each other” and Becka stated that “it was fun to hear what other people were doing and how they were utilizing their technology.” Although she valued the collaboration, Janice thought that her cohort experience would have been improved by content-area specific sessions: “The collaboration was very important. It would have been better if we had time built into each session to work in content areas but I don’t think there were enough of us to make that very meaningful.” Alice stated that “collaboration was probably the number one most helpful thing” and Sylvia noted that she found it helpful to “[see] what other people were doing in the classroom.”

Even though the cohort participants were from different content areas, the collaboration was still beneficial according to interview responses. Julianne said, “We learned a lot from each other and it was cool to see how a particular teacher might use something in their class. It really got me thinking and I wanted to try some of the things they were doing.” Becka said, “It was fun to hear what other people were doing and how they were utilizing their technology. That is always interesting to me. I always want to hear how people are making it work in their classrooms.” Gwen commented that, “Probably the best thing was being able to share ideas with each other so that we could think about how best to use what we were learning with our classes.” Despite seeing the benefits of members sharing their classroom technology experiences, Sylvia expressed her frustration with collaboration that did not result in classroom action, saying that “It was good to hear what everyone was doing . . . we’d have these conversations, but then we didn't have time to actually implement or practice or do in the blended learning. Instead of just talking, let’s do.”

Due to the limited time available during each synchronous cohort session, teachers were unable to delve deeply into blended learning lesson planning. There was insufficient time for

them to hear how others were using blended learning and then work with each other to plan their own similar lessons. Instead, the teachers heard the ideas and then had to make time for their own technology experimentation outside of synchronous cohort hours. Additionally, not all members felt that cohort collaboration was possible for them. Koko expressed her disappointment that peer collaboration during the synchronous cohort sessions was challenging for her, given that she was the only librarian who participated in the cohort. "I guess all educators are considered my peers, but I didn't really collaborate with anyone within the school."

Summary

Collectively, the participants spoke positively regarding their cohort experiences and their subsequent use of blended learning in classroom instruction. Although many participants expressed initial hesitancy regarding a shift to blended learning, Alice, Julianne, Koko, Mary, Sarah, and Sylvia were enthusiastic about changes they observed in their instructional settings stemming from their experimentation with blended learning. Peer collaboration and the asynchronous opportunities were identified as a benefit of the cohort experience. All participants provided meaningful feedback regarding the format and implementation of the cohort in addition to sharing ideas to improve subsequent blended learning cohort experiences.

Case Study Findings

This section will examine the findings of the case study, focusing on the interviews and observations of the three case study participants. One or more descriptions of an observed lesson will be included in each participant's section.

Alice: "I Need to Step Up"

Alice taught five 50-minute periods of regular and honors science classes and had two 50-minute planning periods per day. Alice's class sizes ranged from 19 to 26 students and her

classroom had an interactive whiteboard and tables so that students could work in collaborative groupings of four to six. She allowed students to move around the classroom, had them work collaboratively, and required daily technology use. Alice had clear classroom expectations for her students, which were posted on the whiteboard at the front of her room and included directives for her students such as tidying their space following lab work, bringing their Chromebooks to class daily, and class procedures such as requesting bathroom or water breaks. Despite Alice's observed efforts to regularly incorporate blended learning into her classroom instruction, her ineffective classroom management did not allow students to fully engage in effectual technology use.

Research Question 1: Personal domain. Within the personal domain (Clarke & Hollingsworth, 2002), Alice had positive attitudes and beliefs regarding technology. Alice's classroom observations, however, contradicted case study interview statements regarding her attitude and beliefs and her personal experimentation. Her instruction incorporated many different technology tools, but it appeared challenging for her students to maintain concentration on technology instruction due to the numerous interruptions owing to her poor classroom management. Alice spent much of her instructional time managing student behavior such as students calling out, off-topic conversations, disruption of peers, and technology misuse, which reduced her time available to implement blended learning. Additionally, due to her classroom management style, it was challenging for the observer, and likely Alice, to note the salient outcomes stemming from her implementation of blended learning.

Alice enthusiastically endorsed the benefits of experimenting with technology in her own classroom, saying, "I want to push this part of progressive education in my own classroom and see if that's going to change the way my students grasp the information" (First Case Study

Interview). Alice also expressed that she felt uniquely qualified to incorporate technology given her subject area of science, her age respective to other members of her department, and her relevant skills. She stated,

> I already had all of these skills that were relevant to the area and I had a lot of co-workers who did not have any of these skills". . . . "I'm science, so I should be already using tech. It makes sense. Part of the whole STEM thing" (First Case Study Interview). . . . "I think older people, not just teachers, are less likely to embrace new technology" (Second Case Study Interview).

Alice shared that she joined the blended learning cohort in her second year of teaching to better integrate technology, saying, "the cohort gave me better tools" (First Case Study Interview). Alice noted that she felt compelled to join the cohort so that she could be a role model for her department: "I need to step up because no one else is going to and I'm the most qualified to do so" (First Case Study Interview). In addition to her strong beliefs about the importance of technology and the benefits of participation in the blended learning cohort, Alice credited her technology use as being considerably influenced by the launch of the 1:1 initiative in her school. "I wanted to make sure that we were using the tools not just as toys but as important learning devices" (First Case Study Interview). Alice indicated that her shift to blended learning and her belief in the efficacy of this approach changed her instructional practices. "Everything is blended now. I keep all my schedules online, all my calendars online, my warm ups are predominantly online, digital lessons are online, Nearpod, so they can always access their notes." Through blended learning, Alice was able to extend student learning opportunities outside the traditional classroom. "I sent all my students, via their Google Classroom, a link to a shared-to-me Google Docs that preloaded all the stuff they needed for the science fair" (First Case Study

Interview). This instructional shift was beneficial for Alice, as she was able to save class time by having students preview materials at home; instructional time could be spent answering student questions instead of, for example, disseminating science fair information. “So it was more explicit, so my students could take it home, look at it . . . and then we could actually talk about potential projects and experiments in class” (First Case Study Interview).

As she created additional learning opportunities, Alice commented that blended learning helped her differentiate student learning.

> Differentiation of blended learning is one of my favorite parts of blended learning. . . . There’s tons of software that makes my students able to access the material on their level. And that’s exactly what I’m looking for, is instruction where my students are to help them grow and expand their zone of proximal development. (First Case Study Interview)

Alice was able to differentiate instruction for students through the use of various technology tools. She shared a specific example of differentiated instruction via Newsela [an instructional content platform] by inputting students’ reading levels so that each student received the instructional material at their ability level to ensure equity of access. Being able to share content digitally also allowed Alice time to work closely with those students who required additional support:

> When I’m instructing in blended [learning], I tell my students how to access the material. I tell them what’s expected of them, and then I differentiate and go around to students who I know need the instructions either repeated or need extra help understanding what they’re doing within the program. (First Case Study Interview)

Differentiation of student instruction was a central theme for Alice throughout her blended learning cohort participation and during her subsequent implementation of blended learning.

Research Question 2: Implementation. Alice noted that her shift in instructional practices frustrated her students at first, as it pushed them out of their comfort zone. “I shifted my use of technology in my classroom. My students, at first, were frankly frustrated and then incentivized by it” (First Case Study Interview). Using the language of the interconnected model of professional growth, Alice's experiences in the external domain (i.e., blended learning cohort) led her to enactment in her domain of practice (i.e., instructional experimentation) and reflection on her personal domain (e.g., beliefs about how students learn with technology). Alice stated that blended learning allowed her to incentivize her students by using Hapara, a Google Suite management system in which she could send files to students, view students’ device screens and browser tabs in real time, provide students with immediate feedback, and easily share content with all students simultaneously, either in groups or individually. Alice’s classroom instruction was a reflection of her ability to comprehensively plan for technology-infused lessons as well as traditional lessons.

Alice engaged in frequent professional experimentation by implementing blended learning but was hampered by classroom management concerns. She noted that challenges to blended learning implementation were “related to making sure my students are on task and making sure they can access it [the technology] and trying to get them engaged”; she admitted that she struggled with “convincing my students to enjoy using it [blended learning]” (First Case Study Interview). During classroom observations, I often saw Alice coaxing her students to engage in the activity with mixed success. Alice’s students were frequently off task, due in part to her ineffective classroom management and often seemed to see how far they could push the boundaries before she punitively restricted their technology access. In the second classroom observation, for example, one of Alice’s students loudly played a song 12 times on his

Chromebook before she used Hapara to block the website. In the fourth classroom observation, another student spent most of the 50-minute class period stealthily crawling underneath the classroom tables to the delight of his classmates. If Alice noticed this behavior, she did not address it at the time.

Rather than focusing on the lesson content during technology implementation, Alice was frequently heard bargaining with students. “Once you finish the assignment, I’ll turn off Hapara” (Third Classroom Observation). As a result of Alice’s bargaining for assignment completion, students shared answers with each other to complete the required assignments more quickly. Alice viewed this bargaining as incentivizing students to remain on task so that they could earn two minutes of free time at the end of the class period. When asked about perceived changes in classroom management due to blended learning Alice responded positively, “It [blended learning] motivates students who were unmotivated before because they now know that they can get the things they want back, should they be able to handle themselves” (Second Case Study Interview). This extrinsic motivation seemed to incentivize numerous students, but many continued to remain off task and disengaged in the blended learning lesson. These observed behaviors conflicted with Alice’s perception that her students were increasingly engaged due to her blended learning implementation.

As Alice continued incorporating blended learning lessons throughout the semester, she saw that her students became more comfortable and more engaged in their individual learning. As Alice noticed this increased engagement (i.e., domain of consequence), she continued her professional experimentation (i.e., domain of practice), with the technology tools (i.e., external domain), that she found most helpful for her students. Alice regularly asked students to view and interact with Nearpod at home to reinforce vocabulary and to help with note taking. When some

students did not complete their work at home, class time was spent allowing those students to finish their work. Students who had completed their work at home were required to wait for their peers to finish before the class could move on, which led to uneven lesson implementation and a lack of cohesive instruction across class periods.

Alice's lesson (Third Classroom Observation) on biomes was designed as a flipped lesson and students had been asked to watch a Nearpod video at home the evening before. The Nearpod video, narrated by Alice, introduced estuaries and wetlands and identified the characteristics of each. Alice expected to spend class time discussing nearby estuaries and wetlands impacted by erosion and pollution. Her goal was to have students apply their new knowledge to consider possible ways these environments could be protected. As Alice began the warm up it became evident that only a handful of students had viewed the Nearpod video as instructed. This required Alice to adjust her instruction and allow students to watch the video during class time. As over half the students had not brought their Chromebooks to class, Alice had to establish stations where students viewed the Nearpod while students who had previously viewed the video were allowed free time. The necessity of having to wait for peers to finish the video resulted in frustration from those students who had completed the lesson as directed and now had to wait for their peers. Alice also appeared visibly frustrated and loudly reiterated her expectations that students were to have completed this work at home. This lesson adjustment took nearly half of the 50-minute class period leaving students with limited time for a meaningful discussion regarding human environment interactions.

In contrast, most of Alice's students appeared engaged when she used the stations model to teach about renewable and non-renewable resources via Edpuzzle, a video editing and commenting tool. One student, however, was adamantly opposed to the lesson and loudly and

repeatedly stated, “No one want[s] to do this. No one.” (Second Classroom Observation). Alice spoke quietly with this student to help redirect her and minimize the classroom disruption. During this lesson, Alice first asked all students watch a brief Edpuzzle video about resource types and then divided students into six stations where they worked collaboratively to identify renewable and non-renewable resources in the three distinct environments of Brazil, China, and the United States. To assist students in completing the assignment, each station grouping was provided with photos of each country and a notecard listing the country’s known resources. Students then sorted the resources into renewable and non-renewable. Alice positively rewarded the stations that correctly finished the resource sorting activity by unlocking their Chromebook via Hapara and providing students with unstructured free time. As evidenced across the classroom observations, although numerous students habitually remained off-task and required frequent redirection, many of Alice’s students did respond positively when she included technology tools. Alice felt that her use of blended learning afforded her students greater opportunities to make real-world connections by allowing greater access to scientific concepts outside the classroom.

Despite the stated and observed challenges, Alice spoke positively regarding the shift in students’ salient outcomes due to blended learning implementation. Specifically, Alice praised the creativity of her students as they attempted to solve scientific problems. Her students worked for a class period to research potential solutions to the Great Pacific garbage patch and created a brief presentation in Google Slides to showcase their suggested intervention. Alice said, “They’re not just regurgitating information…I wanted to push them, even my lowest students, to be creative with the information” (First Case Study Interview). Alice was impressed with the creativity of her students’ solutions and said that blended learning “changed student learning by

giving them the ability to think through the problem and it was evidenced in the stuff they created" (First Case Study Interview).

Research Question 3: Decision making. In addition to deciding which technology tool to incorporate, Alice considered possible barriers when deciding to plan a blended learning lesson. When asked what factors she considered when deciding to implement technology, Alice laughed and said, "Is the Wi-Fi going to work?" (First Case Study Interview). After composing herself, Alice noted that she wanted to "make sure that I'm both pushing my high learners and bringing my low learners up in the same fell swoop because I'm not going to do two technological activities in one class period to reach both of them" (First Case Study Interview).

When she decided which technology tools or practices to use in her instruction, Alice relied primarily on the school's TISs and her own research to help find relevant resources. During her time in the cohort, though, she did at times also rely on peer recommendations for technology tools. "If I was having difficulty with something or if one of my coworkers had just tried to implement something, my coworkers would inspire me to try new things and the TISs and the blended learning folks would support my implementation" (Individual Interview). Specifically, she praised the supportiveness of her school TISs in helping her learn about technology and assisting her in using technology in her classroom. "My TISs are supportive of finding me new resources to try" (First Case Study Interview). Alice believed that her school level supports were extensive but that school administration support was based on division-level expectations rather than on their own perceptions of the potential benefits of blended learning: "I think my administration is supportive of blended learning because that is the directive from the top-down" (First Case Study Interview). She shared that her school administration was not thoroughly versed in the uses of technology, safety, and protection of information on a large

scale. She said, “It’s fun to be micromanaged by people who don't know what they’re talking about, in a specific way, if I may be brutally honest” (First Case Study Interview).

Additionally, Alice conducted her own research and attended school division provided PDs to find technology tools and technology resources for classes. “I see what I can find, or I go on recommendations of people I know, or I scour the Internet to find a specific thing” (First Case Study Interview). She spoke specifically about her participation in the blended learning cohort, blended learning camp attendance, and the school division’s technology leadership project as PD offerings that provided her with technology resources. The consideration of these factors demonstrated that Alice was interacting in both the external domain and the domain of practice (Clarke & Hollingsworth, 2002) as she considered blended learning implementation following her cohort participation.

When making decisions regarding which technology tools or techniques to use in her instruction, Alice examined student data to help her choose the best resources for her students. These student data helped her consider how to reach struggling students and how to push high-achieving students.

> I use my data to inform how I can better reach the students who are not achieving. But I use my data to inform how to push my students who are . . . highly achieving the information to the point that they were bored in class, how I can push them further into the curriculum, into deeper issues. (First Case Study Interview)

When lesson planning for blended learning lessons, Alice stated that she did not plan differently than she did when planning a traditional lesson. “I plan for all my lessons similarly. I don’t feel like I need to differentiate between a regular lesson and a blended learning lesson. They’re just the same thing with a different way of accessing it” (First Case Study Interview).

Alice did note, however, that planning blended learning lessons did require her to be aware of possible lesson workarounds if the planned technology did not work.

> It's just like planning for a regular lesson. I just have to be aware if there are going to be workarounds or I'm going to do it differently. Even if it's a lesson that's not blended, you're going to have a backup way to get the material. (First Case Study Interview)

Alice's examination of student data demonstrated her application of the knowledge gained via the external domain to the domain of practice to enact changes in the domain of consequence (Clarke & Hollingsworth, 2002).

Although Alice felt confident in her technology decision making, a challenge she faced when seeking to implement her choices was inconsistency in technology expectations at the division, school, and department level. These inconsistencies hampered her professional experimentation in the domain of practice. For example, Alice struggled to find current content area media to share with her students when implementing blended learning lessons. "The library doesn't have a DVD for science that is under 15 years out-of-date . . . Since the district hasn't updated its information, people that are by-the-book [administrators who adhere to outdated policies] are inconveniencing me" (First Case Study Interview).

Summary. Alice was an enthusiastic user of blended learning technology who stated she was happy to be on the forefront of technology adoption in her school as a teacher who regularly incorporated blended learning in her classroom. Using the language of the interconnected model of professional growth, Alice's experiences in the external domain (i.e., blended learning cohort) led her to enactment in her domain of practice (i.e., instructional experimentation) and reflection on her personal domain (e.g., beliefs about how students learn with technology). Alice frequently experimented with new technology tools to investigate what may be successful for her students'

learning. Students' learning, engagement, and real-world problem solving are salient outcomes in the domain of consequence (Clarke & Hollingsworth, 2002). Alice's classroom management, however, often made it difficult for students to engage with her blended learning lessons as planned. Student disruptions were common, and students were routinely off task. Alice's frequent redirection of students appeared to detract from her instruction. Despite this continual redirection of students, Alice appeared unaware of the potential student learning impacts of her ineffective classroom management. Over the course of the 3 months of observations, her classroom management style did not change even as she changed technology tools regularly. Although Alice spent significant time engaged in professional experimentation, it was difficult to determine the salient outcomes of this experimentation. Alice was confident in her technology use practices and in her ability to serve as a technology role model for her department and her school. "I enjoy using blended learning in my classroom, and I think it is the way we are headed in the future, and I just want to be there to see what happens" (Second Case Study Interview).

Julianne: "I Want to Keep Myself in the Loop"

Julianne taught sixth-grade social studies and had 20 years of teaching experience, including 3 years at VVMS. She taught five 50-minute periods of regular and English Language Learner social studies classes and had two 50-minute planning periods per day. Julianne's class sizes ranged from 22 to 31 students, her classroom contained an interactive whiteboard, and student desks were arranged in groups of four. To encourage student collaboration students worked individually, in pairs, or in quads. These groupings were rotated once per quarter. Julianne's classroom functioned largely autonomously and students seemed aware of classroom behavioral expectations. Julianne's posted classroom policy of "ask three, then me" encouraged student self-sufficiency and problem solving.

Research Question 1: Personal domain. Julianne's beliefs about the value of instructional technology drove her technology-use practices and reflection on her external domain led to changes in her personal domain (Clarke & Hollingsworth, 2002). Specifically, Julianne wanted to continue her own technology learning to combat possible stagnation: "I have seen teachers that are so uncomfortable with the technology in the building that they are almost paralyzed with fear to even try. And I . . . don't want to be that way" (First Case Study Interview). Julianne honed her technology knowledge through frequent participation in division-offered PD opportunities, including the blended learning cohort and the technology leadership project. During classroom observations, Julianne's students were seen engaging in problem solving and asking clarifying questions in their peer groupings prior to discussing questions with her.

Julianne's positive technology beliefs motivated her to take technology risks and to bring her knowledge to her classroom with a goal to increase student engagement. "With technology, it's easier to find and access materials that you need. Easy to get it to them. The students just like it" (First Case Study Interview). Julianne evinced positive attitudes and beliefs related to instructional technology and stated that she felt that it was important to experiment with technology in an environment where taking chances is acceptable. "I think that school should be fun. I do. I think that it should be an opportunity to try new things, and do miserably, do great, whatever. Just try it" (Second Case Study Interview). Julianne noted that discussion of blended learning techniques and the integration of blended learning in instruction had increased recently, with recent PD experiences both promoting the benefits of blended learning and incorporating blended learning concepts for the educator participants. "If you look at professional development, 99% of it is blended learning strategies where we're going to talk as a group; we're

going to communicate and develop groups to talk about stuff" (Individual Interview). Her participation in the blended learning cohort helped encourage Julianne to continue using technology to enhance student learning, but she noted that it was challenging to consider how best to incorporate technology:

> I think you have to think what is it that cannot be done without the technology. And there are things that without the technology it's not doable, it's not possible for them to do. So it's not just about replacing activities, but how does it enhance the activity? How does it allow them to do something that they couldn't have done ordinarily? (Second Case Study Interview)

Julianne thought it was important to infuse technology in education; specifically to incorporate digital media, as she felt this helped prepare students for post-secondary pursuits. "This is what they're going to be using and doing when they get to college, or they go into the workplace" (Individual Interview). Julianne believed that blended learning offered components of traditional and non-traditional education, which supported both the school division's and her own 21st century learning goals. "I think it goes back to that idea of differentiation. The blended learning concept is that you have traditional teaching methods that are paired, or include, some digital media. And this is sort of where we're going" (Individual Interview). Julianne found the ease of differentiated instruction via blended learning to be compelling for both her and her students.

> With Google Classroom it's nice because you can actually send different assignments to them than other students. And they don't know. And I have various things hotlinked where they can see the very same document, but in Spanish, or the Lexile readability is lowered. They don't know. And that's kind of a nice way for me to be able to

differentiate. And that's probably what's impacting what I'm doing, mostly. (Individual Interview)

Julianne shared that the increased differentiation opportunities were beneficial for her students: "I can sometimes [have the students] work independently and be able to reach the individual needs of the kids better in the class, so that helps" (Second Case Study Interview). She felt that the use of blended learning helped to increase differentiation by providing greater access for all ranges of students. "So, the lower level students have responded and benefited the most, I would say, from blended learning. The creativity was always there, but now the lower level students can be included better" (Second Case Study Interview). Julianne also noticed that students appeared more engaged in their learning when they were given greater ownership over their learning.

> I find I struggle less to get them to stay on task or pay attention [when they're engaged in blended learning activities], because they're really interested. They've chosen the topics that they're interested in. But it's being guided by me. So it's not just a, 'Learn whatever you like.' There is a level of, 'Okay. I'm controlling this.' (Individual Interview)

This concept of student ownership was a central theme for Julianne throughout her blended learning cohort participation and during her subsequent implementation with her students. As she implemented blended learning, Julianne experimented with multiple technology tools. Although she realized that not every technology tool she attempted would capture student interest, Julianne spoke positively regarding her attempts with various technology tools. "Being introduced to a variety of things is hit or miss. Sometimes they're going to work out though. Sometimes you have to say, 'Doesn't work for my style.' But you've got to try enough to figure that out for yourself" (First Case Study Interview).

Research Question 2: Implementation. Julianne's regular use of instructional technology demonstrated her continued professional experimentation in the domain of practice (Clarke & Hollingsworth, 2002). Julianne's implementation of blended learning stemmed from her belief that blended learning offered greater possibilities for her students. "With technology I really could push the envelope" (Individual Interview).

In the first classroom observation, Julianne's students took part in a simulation regarding the Bill of Rights. In quads, students prioritized which rights were most important and then developed their own classroom pamphlet of protections. The students worked collaboratively in a shared Google document to delineate their core set of protections. Finally, students created their finished pamphlet using whatever digital presentation tool they preferred. The wide availability of student choice within the structures of Julianne's assignment appeared to support student engagement and interest in the lesson and also supported Julianne's learning objective, which asked students to apply the concepts in the Bill of Rights to their social studies classroom. Classroom management in this class of 28 students did not appear to be an issue in this despite the comparatively high number teacher to student ratio. Students worked efficiently with their peers to complete the task at hand and off-task behavior was not observed. The use of a shared Google document allowed students to continue collaboration outside of school and most students were observed creating their pamphlet presentation in Google slides, which also provided them with the opportunity to continue collaboratively working on their assignment at home.

During the second classroom observation, Julianne's students were seen working in pairs to develop a three-dimensional (3D) product using digital design software called TinkerCAD. The purpose of this assignment was for students to create a product that was representative of an American president and that could be sold in a presidential souvenir shop. Students were

required to include various details to represent the specific president and the product that received the most votes from classmates would be created using the school's 3D printer. Students were visibly engaged in this lesson and excitedly discussed their 3D creations. The addition of the competitive element may have been a factor in this observed engagement. The use of TinkerCAD allowed students to digitize and apply their understanding of class content via a unique technology tool. Despite the palpable student enthusiasm, students remained on task and worked diligently on their 3D designs. As students designed their 3D product, Julianne met individually with student pairs to determine whether their proposed product met all assignment requirements.

Julianne stated that her experimentation with technology helped her students' technology experimentation and "should have an impact on what they're [students] taking in" (First Case Study Interview). Julianne's cohort participation helped her to encourage her students to become technology innovators because "I allowed myself more time to kind of think of activities that allowed them to really stretch their ideas, build upon their ideas, and become innovators" (First Case Study Interview). As Julianne continued to regularly incorporate blended learning in her classroom instruction, she noticed that changes she was making were "providing [students] a broader understanding of history" (First Case Study Interview). Specifically, Julianne noticed that students were having more fun in her classroom as they experimented with various technology tools. "I think that sometimes you find the right program, you find the right topic, whatever it is. You marry them together and you might come up with something very interesting and different" (Second Case Study Interview). Julianne shared an example of a lesson in which she required students to use WeVideo to create a documentary film about Native American tribes.

> I had kids use WeVideo to do their documentary films. And they were just really like, 'No, I don't want to do that. I hate the sound of my own voice.' Or, 'I don't really know how to use technology.' They were so afraid of it before they even tried it. And then once they realized how dead simple it is, they loved it. And then they wanted to do more. (Second Case Study Interview)

Julianne felt that her instructional shift to blended learning led to student enthusiasm and interest without significant changes to her instructional practice. Like Alice, Julianne felt that blended learning instruction featured the same concepts as traditional instruction and required adjustment only when deciding which particular technology tool to use.

> I wouldn't say that the method is changed in any way. The tool that you're using is changing but you're trying to . . . match the tool with what the objective is. It's the same if I didn't have the computer. It would be the same thing, I'm like, 'Okay, am I going to make flashcards? Are we going to do a graphic organizer?' But now it's going to be, 'Oh, are we going to do an EDpuzzle? Are we going to do an Edmodo or are we going to do? It's the same thing'. (First Case Study Interview)

When reflecting on future lessons, Julianne stated that blended learning could be used to help students develop collaborative digital portfolios. "I want to continue to do what I'm doing, but maybe try to introduce some new programs. Things that will allow them to have some sort of culminating activity that they can use, maybe some sort of online portfolio" (First Case Study Interview). Julianne felt that blended learning outcomes such as the creation of a digital portfolio would support her technology use objectives for her students and she spoke enthusiastically regarding the ways in which blended learning could help students become technology producers. "In real life, we tend to play on our strengths, find the areas that we're best at, and make that our

career path. [You've] Got to produce something. That's what I tell the students, 'Produce something'" (First Case Study Interview). Julianne's focus on student choice empowered her students to step outside their comfort zone with regard to technology experimentation.

Julianne believed that blended learning required experimentation and trial and error and elaborated that her implementation of classroom technology stemmed from a desire to keep her instruction current and to continue learning how to use new technologies. "I think I want to constantly keep myself in the loop on what the new technologies and the new programming. And that way . . . I keep up with the times" (First Case Study Interview). Seeing the salient outcome of students' learning gains and students' comfort with technology tools encouraged Julianne to continue implementing blended learning in her classroom. The enactment in Julianne's beliefs and attitudes in the personal domain and her cohort participation in the external domain led to changes in her instructional environment in the domain of practice (Clarke & Hollingsworth, 2002).

Research Question 3: Decision making. Julianne's instructional decision making was driven by considering how enactment in her personal domain and external domains may best result in salient outcomes for her students. Julianne's external domain comprised both her participation in the blended learning cohort and the environment in which she was situated as she implemented blended learning with her students. Julianne's technology-rich school setting provided her with access to a variety of instructional technology options. When deciding which technology tool to use for student instruction, Julianne stated that she considered "ease of use, time that it takes to learn the program, and how many distracting items does it [the technology tool] have" (First Case Study Interview). Additionally, Julianne was pleased that blended learning technology tools offered a way to extend student learning outside of the school day.

> I think it's nice also that there is that home element, that they can continue the learning at home and it doesn't have to stop here in the building, which in many ways extends my day. So I can assign things and then they can do it at home and very often, if it's entertaining enough . . . they will do it. And then you have something to talk about when you come back and something that you can kind of build on when they return. (First Case Study Interview)

Although blended learning led to increased student engagement for Julianne, she noted that blended learning lessons were time consuming and required significant time devoted to planning. Julianne's TISs were a noted support in overcoming time constraints and Julianne spoke favorably regarding the role her TISs played in helping her lesson plan for technology-rich instruction.

> We have professionals in the building, like our TISs, that are always asking how they can help. Always inquiring how they can support the classroom. There isn't probably a week that goes by that they do not email saying, 'What can I do? What can I do to help you?' So I think that there is that support. (First Case Study Interview)

Julianne's assured decision making did not extend to comprehensive evaluations of particular technology tools and Julianne admitted that she struggled to evaluate technology tools to ensure their effectiveness: "I'm not good there. I think I just test it out. I see what it can do. If it serves the purpose that I'm intending it to serve, then it's good enough for me" (First Case Study Interview). In addition to considering the instructional benefits of the particular technology tool, Julianne also carefully weighed the amount of time that students would require to be able to accurately use a technology tool against the potential student learning benefits when she made decisions regarding instructional technology use.

> What I think I'm looking for is how time consuming is [the technology tool]? How much time does it take for the kid to understand how to use this program? If it's going to take me days to explain how to use it, I'm probably not going to use it. (First Case Study Interview)

In her first case study interview, Julianne stated that she deliberately considered how technology could enhance learning as opposed to simply substituting technology.

> When I'm thinking of developing a lesson, I try to think, 'How will technology enhance the learning?' Not just simply substitute. So it's not just me trying to find a way to easily give them a worksheet. I could've just as easily printed the worksheet, but [I'm thinking of] ways that the technology could enhance their ability to demonstrate their understanding.

Julianne stated that she thought of the technology first and then what unit or lesson in which she could use the particular technology tool.

> I think the tool comes to my head first, and then I try to think of where it would best be served. Or where it would be fun to plug in. So I think I learn a program first and go, 'Ooh, this looks like fun. When can I use it?' Not necessarily the other way around. (First Case Study Interview)

The particular technology tools Julianne selected to use also required her to make technology decisions. Julianne noted that she had to assess potential challenges of the technology she planned to implement before she used it in her class, which required her to spend more time on planning.

> It's more time consuming because I'm going to have to play with the program myself for quite a bit so that I see all the pitfalls, all the possible things that could go wrong because

you can't afford to have that going on with 30 children that are 11. (First Case Study Interview)

Julianne preferred to work with her TISs to help her introduce new technologies in her classroom and to minimize her own learning curve. "I usually try to include my TISs if it's something that's very unfamiliar to me because again, I want to minimize the amount of figuring it out time" (First Case Study Interview).

Summary. Julianne was a thoughtful technology practitioner and her implementation of blended learning demonstrated her classroom management and instructional skills. Within the external domain, Julianne sought to continuously improve her educational technology knowledge through participation in technology professional development opportunities. Julianne's enactment in the external domain via participation in the blended learning cohort led to changes in her domain of practice and resulted in salient outcomes in the domain of consequence for her students (Clarke & Hollingsworth, 2002). For example, Julianne's students worked collaboratively in pairs or quads to create and innovate with classroom technology. Julianne's well-structured classroom environment allowed her to implement blended learning in a manner that engaged and challenged her students. Julianne noticed clear student benefits and increased student creativity deriving from the implementation of blended learning as she engaged in regular technology experimentation via the domain of practice.

Mary: "I'm Not Afraid Anymore"

Mary taught five 50-minute periods of language arts for special education and language arts for English language learners classes and had two 50-minute planning periods per day. Mary's English language learners presented with varying levels of English proficiency ranging from 1 to 3. Her Level 1 learners were considered to be beginning English proficiency, whereas

her Level 3 learners were deemed to have attained intermediate English proficiency. Her special education classes also featured a range of student ability levels with some students receiving specialized instruction from a case manager. Mary's special education class sizes ranged from 11 to 15 students and her English language learner class sizes ranged from 9 to 14. Her classroom featured an interactive whiteboard at the front of the classroom and Chromebook charging docks for student use in the back of the classroom. Students were arranged in straight rows of desks with more disruptive students assigned to solitary desks near Mary's desk for proximity control purposes. The desk groupings were re-arranged throughout the day, depending on whether she was teaching special education, English language arts, or English language learners.

Research Question 1: Personal domain. Mary showed positive attitudes and beliefs regarding the efficacy of instructional technology use and, despite her initial hesitance, her experimentation in the domain of practice led to changes in her personal domain (Clarke & Hollingsworth, 2002). Although she perceived the influx of new technologies as "sometimes a negative," she also regarded the rapid pace of technology as a benefit "because then there are new things and you're trying different activities and different styles of learning need different things" (Individual Interview). Mary viewed herself as a "continual learner" and felt that this personality trait helped her to "get a little bit more information and learn some more things [during the blended learning cohort]" (First Case Study Interview). Mary initially struggled with the concept of blended learning, specifically the fact that blended learning "is a lot of student-led" (Individual Interview) because of the unique students she taught.

Mary provided limited opportunities for students to work together; students completed assignments alone most of the time. This varied by class, however, with Mary encouraging her English language learner students to work together more often than her students with special

needs due to her English language learner students' need for language acquisition and practice. Mary's students often required redirection for off-task student behavior, such as students leaving seats to disrupt other students, frequent calling out, and off-topic conversations. Mary's classroom dynamic indicated clear expectations for student behavior and established classroom procedures such as students plugging their Chromebook in the charging station, checking the agenda displayed on the SmartBoard to help guide their next steps, picking up their student folder, signing in on a classroom roster, and beginning the warm-up activity when they arrived in class. Students appeared to understand where they could locate useful classroom resources such as the charging station, individual student folders, and papers or pencils. Although these expectations and procedures seemed clear, Mary was heard frequently reminding students to follow directions and established classroom norms. During classroom observations, most students were seen immediately soliciting help from Mary rather than attempting to resolve confusion through trial and error or by asking a classroom peer for assistance.

Relinquishing some aspects of teacher control was challenging for Mary due to the contrast in how she had traditionally provided instruction for her particular students and subject areas. "As a special education teacher, letting them go by themselves was hard" (Individual Interview). Due to her technology experimentation during the cohort, Mary noted that by the end of the cohort experience "There were things that I think we started to do well, and it was student-led. So, my feelings changed throughout for the positive" (Individual Interview). Despite her initial reticence, Mary's open-minded approach and active participation in the external domain of the blended learning cohort enacted a shift in her personal domain and subsequently led to changes in her domain of practice (Clarke & Hollingsworth, 2002). Mary evinced positive attitudes and beliefs toward instructional technology and shared that she felt using technology for

instructional practice was essential "especially with 21st century learning since there's always something new" (Individual Interview). In considering the importance of classroom technology, Mary further stated "I think that you have to use it [technology], especially with the children that we're working with today. And if you're not using it, then you are missing out" (Individual Interview).

Mary stated that her participation in the blended learning cohort "made [her] less afraid" (First Case Study Interview). Although Mary initially perceived using a variety of technology to be "kind of a little bit scary," her experiences in the cohort changed this perception and she was "not afraid anymore" (First Case Study Interview). Mary felt that without her participation in the cohort she would not have "been as open to it [blended learning]. I don't think I would've been as confident and not afraid" (Second Case Study Interview).

Her confidence to continue experimenting with blended learning was strengthened by witnessing her cohort peers' attempts with blended learning. "It was good to see how other people were doing it [incorporating blended learning] and other people had failures and successes and I thought 'Okay, I can do this too, because that's what everyone else is doing'" (Second Case Study Interview). Mary's technology confidence grew as she interacted with her peers during the 9-month cohort and she was able to eventually help others with blended learning techniques. "Oh, I actually know how to do this and they [other cohort participants] don't know how to do this. So, I can help them" (Second Case Study Interview). Collaborating with peers was a driving factor in her cohort participation and subsequent blended learning implementation.

As Mary employed blended learning following her cohort experience, she stated that her cohort participation had been improved by the presence of her co-teacher "because we could talk about things we were going to do in our class, or what we had done in our class and what we had

seen" (Individual Interview). This embedded collaboration during the cohort encouraged Mary to continue blended learning experimentation with her students and with her co-teacher after the cohort ended. Mary also spoke positively regarding the diversity of subject matter in cohort participants "because then you hear how everyone's using [blended learning], not just the way that I would think to use it in a special ed[ucation] classroom or teaching language arts" (Individual Interview). Changes in Mary's personal domain due to experimentation in her external domain and observed changes in her students' domain of consequence encouraged her to incorporate blended learning in her domain of practice.

Research Question 2: Implementation. Mary stated that she implemented blended learning "at least a couple times a week, if not daily, depending on what we're doing" (First Case Study Interview). She regularly used the station model when she used blended learning, which provided her students structured collaboration time while allowing her to easily differentiate instruction. Using blended learning via the station model allowed Mary to individualize student resources through Google Classroom without other students knowing the content was individualized at the student level. Teachers at VVMS were "directed to do stations once a week" (Individual Interview), and Mary found it logical to introduce a blended learning component during this mandated instructional time. This school goal aligned with Mary's technology objectives and she chose to integrate technology during her stations. Mary used data "to make my stations. That's how I divide my kids and then I determine what we're doing. Initially I put them where they need to be to start" (First Case Study Interview). As her students participated in stations, Mary made instructional adjustments depending on individual student needs. Mary had multiple student ability levels in her classroom so "some of them [students] are doing more blended learning than others based off of what they're doing" (First Case Study

Interview). Mary clarified that students who required direct instruction did not participate in online video skill practice as regularly as their more autonomous peers.

> Some kids may need more one-on-one instruction with me, so they're not going to use the Chromebook, or they're going to be using it but it's going to be teacher-led. The ones that I think have mastered the skill or are doing better, they're going to be on the Chromebook. They're going to be doing self-guided practice. They're going to be using quick assessments. (First Case Study Interview)

Mary used trial and error when she implemented blended learning and the use of stations required adjustments during instruction. "If it works, it works. If it doesn't work, back to the drawing board; I'll try again . . .You don't know until you try. They're more engaged when they have technology. So, I try to use the technology piece" (First Case Study Interview). She was able to adjust her instruction for students since blended learning provided "a lot of real-time data that's really beneficial" (Second Case Study Interview). Differentiation of instruction was very important to Mary and she felt that blended learning greatly improved opportunities for differentiation when she disaggregated the data obtained during pre-assessment activities. "[Blended learning] helps me differentiate because I can do a lot of pre-assessing and I can say, 'Okay, I am going to make my stations based off how they [students] did on this" (Second Case Study Interview).

Mary carefully grouped students into stations based on their pre-assessment and classroom performance so that each station was structured to students' individual needs. "I know that this group really needs support; this group has mastered this so they're going to . . . get to do more of the independent station. The station with me are kids that need that extra support" (Second Case Study Interview). Although Mary began daily instruction with an individual warm-

up activity, she used stations weekly; station activities were seen during three of the four classroom observations, though the technology tool varied.

Experimentation with blended learning took many forms for Mary. She often attempted ideas she had seen in other classrooms or heard about from her teaching peers. “I’m a co-teacher in a couple classrooms, so if I see somebody else doing something, I think, ‘Oh that’s a good idea. I should do something like that” (First Case Study Interview). The insertion of technology depended on the purpose of the lesson. Mary shared that technology use depended on instructional goals and that “when we’re reading a novel, the only technology that we might see are the discussion questions on the [Smart] board that I’m kind of leading them through” (First Case Study Interview). Technology use also depended on the varying ability levels of the students in Mary’s classes. Mary shared that “some classes are higher [in ability level] than others and they do better with certain models than the other classes. They have more independence in second period than I give them in fifth period because fifth needs more hands-on [activities]” (First Case Study Interview).

Mary also noted that significant time had to be dedicated to monitoring the particular needs and abilities of her students.

> Everything that we do in here we start by me teaching them. And it’s guided instruction. They are not fully independent until they showed me that they can be fully independent. Because we are a classroom of students with learning disabilities, we do things differently. We’re a little bit slower, and I think that is just a structure that they need. (Second Case Study Interview)

In creating structure for her students, Mary felt she was able to “hone in on the specific skill” that students needed to learn, understand, and apply (Second Case Study Interview). Mary stated,

"before you can apply it [the skill] to anything else, you have to understand the skill. Some of the things I think they should know, they don't always necessarily know" (Second Case Study Interview). Mary worked to help her students clearly understand technology tools and skills so that they would be able to accurately apply their knowledge. Due to her individual knowledge of her students, Mary structured technology activities differently for each of her classes, which was possible due to the options provided via blended learning.

Mary shared that she appreciated the options that blended learning afforded herself and her students. "It can be teacher-led and at the same time it can be student-led" (First Case Study Interview). When Mary gave students opportunities to take control of their learning, she found it sometimes difficult for her to step back and allow students to take ownership of their learning. Instead, she had to carefully monitor these student-led opportunities and be prepared to adjust as necessary because "sometimes I judge them too early and given them the independence but they're not ready for it on certain skills. So, we have to go back to teacher-led" (First Case Study Interview). In considering student responses to her use of blended learning, Mary stated that "I feel like I do see change and then other times I'm not sure they're with me" (First Case Study Interview). She reflected frequently on her blended learning experimentation and modified her instructional delivery based on student responses and student abilities to maintain engagement.

Mary noted that her use of blended learning changed her classroom dynamic and that she had "to be prepared for things like. . . kids who don't have Chromebooks, or kids who don't have chargers" (First Case Study Interview). Additionally, Mary stated that she had to think "of multiple different things, of what's going to happen if this doesn't happen, which comes with the territory of being a teacher. But when you're changing your delivery, that is something that can really impact your classroom" (First Case Study Interview). Mary felt that student engagement

was crucial and "you have to keep them hooked" (Second Case Study Interview). Mary kept her students interested by varying the technology tools she used and by developing lessons that allowed her to manage students via Google Classroom's Hapara. "Sometimes they do really well. They become focused. They're engaged in it and they're not as distracted as they would be a whole group and they really get into it. So that's good. And I feel like it's authentic" (Second Case Study Interview).

The changes in Mary's instructional delivery influenced her classroom environment and increased the amount of student-led activities. When she planned for student-led activities featuring technology, Mary relied heavily on her building TISs for technology coaching and support. "Our TISs are really hands-on, and they want to be in the classroom. I consider them a wealth of knowledge. So anytime I have a question, I kind of just go straight to the source" (First Case Study Interview). Mary cited the availability, resourcefulness, and knowledge of the TISs as vital in helping her prepare technology lessons. "Our TISes are awesome. They constantly want to come into the classroom. They're sometimes coming up with lessons to do in the classroom. I go to them for everything" (First Case Study Interview).

During classroom observations, Mary's students often exhibited behavior management problems such as leaving their seats, disrupting peers, being unprepared for class, and excessively talking out of turn. Mary used a punch card system to incentivize her students and to increase their classroom participation. "If you get 19 to 20 punches you're admitted into whatever the monthly activity is . . . extra punches mean there might be a little extra something. If you don't get those punches, then you don't get to go" (Second Case Study Interview). Mary was seen punching student cards during classroom observations and this method did appear to motivate some students to stop talking and resume working.

In the first classroom observation, Mary's English language learner students used Google Forms to answer warm-up questions about grammatical conditions and suffixes. After they completed the review, students were grouped into stations in which they could play a grammar board game, collaboratively complete an online Quizizz, a website featuring gamified quizzes for every subject, activity on their Chromebooks, or read a text passage and complete questions with Mary's assistance. For this particular station activity, Mary grouped her students according to their English proficiency levels. All students reviewed the same grammatical concepts, but they completed the activity differently depending on the station to which they were assigned. Scaffolding was built into Mary's station structure and students were able to navigate to Mary's Google Classroom via their Chromebooks for assistance with directions at each station. Mary rotated around the room to redirect students as needed, but spent most of her time assisting the students with the lowest level of English proficiency who were assigned to the question and answer station. The size of Mary's classroom and the small number of students allowed them to spread out during the lesson, which appeared to reduce student misbehaviors. Students in the Quizizz station used headphones while they completed the activity so that the video did not disturb other students. Students in the board game station focused on pronouncing new vocabulary words and used an online dictionary to verify the correct pronunciations.

In the second classroom observation, Mary's students with special needs began class with a warm up using Kahoot, a game-based learning platform, which the students found very exciting and made it challenging for Mary to refocus students during the next class activity. For the bulk of this class, students worked together in groups of three using shared Google Docs to collaboratively write letters to next year's students. Mary had provided students with the assignment and with a rubric for their letter via Google Classroom the evening before, and

students were expected to have completed their letter for homework. During class, each member of the triad was responsible for assessing one of their peer's letters and then providing feedback in a single shared Google Doc. The peer then corrected or edited the letter as the feedback directed. The use of Google Docs allowed each group of students to see what their peers wrote and provide relevant feedback in real time. Many students had not completed their letter as they had been directed and instead spent class time working on these letters. Mary divided the class into students who had completed the assignment and students who still needed to write their letter. Students who were done reviewed the letters of their peers, edited per peer feedback, and then spent the remainder of class playing games and watching videos on their Chromebooks. During this time the other half of the class was engaged in writing their letters and few students completed the assignment before the class ended and did not have an opportunity to receive or provide peer feedback.

Mary appreciated the opportunity for students to share meaningful feedback with their peers and stated that this type of lesson would not have been possible without blending her learning. "They actually are really engaged in it. It's also a good way to teach working together, communicating" (Second Case Study Interview). Witnessing her students become visibly excited by their classroom activities inspired Mary and persuaded her to continue her blended learning implementation. The intersection of Mary's personal (e.g., beliefs about how students learn with technology) and external domain (i.e., her participation in the blended learning cohort) led to changes in her domain of practice (i.e., instructional experimentation), which influenced salient outcomes for her students in the domain of consequence (Clarke & Hollingsworth, 2002). Similarly, Mary's decision making was also influenced by enactment of her personal and external domains.

Research Question 3: Decision making. Mary's instructional decision making related to technology was motivated by the consideration of her students' needs and how changes in her personal domain could lead to salient outcomes for her students in the domain of consequence (Clarke & Hollingsworth, 2002). Mary's external domain consisted of her experiences in the blended learning cohort and the school context in which she implemented blended learning with her students and co-teachers. She chose to implement instructional technology because "21st century learning . . . is what the kids are growing up with" (First Case Study Interview). Meeting the students at their level was important to Mary and she felt that use of technology was "a good way to reach our children because the kids right now that's how they're learning. That's their source of everything. And if we're not on there, they might not want to listen" (First Case Study Interview). As she implemented blended learning, Mary enjoyed that her students "help me with different things. So I'm learning from them at the same time" (First Case Study Interview).

As Mary attended more technology PDs, she found that "it's [blended learning] become more of a dominant player in my classroom" (First Case Study Interview). During her participation in the blended learning cohort, Mary began to regularly implement blended learning regularly. As Mary incorporated blended learning, her decision making was focused on deciding the lesson objectives and then proceeding with the use of instructional technologies. "I have to think about what skill I want to accomplish, what levels I'm seeing that day, and what my purpose is for the lesson" (First Case Study Interview). Like Alice and Julianne, Mary did not feel that she had to lesson plan for blended learning any differently than she would for a traditional lesson "because it's [blended learning] becoming the traditional lesson" (First Case Study Interview). Her blended learning lessons, however, did require Mary to consider the influence of external factors on her students' learning and to make adjustments where necessary

to improve learning. Mary shared that the incorporation of blended learning in her classroom instruction:

> impacts. . .what kind of activities they [students] can do outside of class because a lot of kids do not have resources at home to complete assignments. And yet we're supposed to give them homework and they're supposed to have the Internet, but you can't always access the Internet at home. (First Case Study Interview)

Mary was frustrated by administrative expectations that did not always match the student reality and felt that this perceived disconnect made it difficult for her to make instructional decisions.

Although Mary felt that her school administrators were supportive of blended learning efforts, she did not feel blended learning was a top priority, "which is why it isn't consistently done [at this school]" (First Case Study Interview). Mary's decision to incorporate blended learning was primarily influenced by her students' learning benefits and less due to her perceptions regarding the instructional technology beliefs of her administrators. "I do think they see the benefits of it [blended learning]. They're all very knowledgeable and they talk about it, but things just get in the way and then it's not top priority anymore" (First Case Study Interview).

The perceived gap between administrative expectations for blended learning conflicting demands for teacher time left Mary struggling to juggle responsibilities. "We try 100 things and we master nothing. Let's try three things and master three" (First Case Study Interview). Mary stated that she wished for "the consistency piece" (Second Case Study Interview) in expectations for blended learning implementation and in technology PD offerings. Mary commented that her decisions to attend technology PD and implement blended learning were directly related to administrator expectations for technology use.

Summary. Mary began the blended learning cohort as a tentative technology user but her participation in the blended learning cohort led to her feeling confident in implementing blended learning, taking technology risks, and even in assisting her peers with technology questions. "I saw that other people were my same skill level. I wasn't the only person who felt that way. And I think once I realized that, it gave me confidence to be like, 'Okay, I can do this'" (Second Case Study Interview). Mary's enactment in the external domain via participation in the blended learning cohort led to modifications in her domain of practice and gave rise to in salient outcomes in the domain of consequence for her students (Clarke & Hollingsworth, 2002).

Mary used blended learning data to help structure her stations for students and incorporated technology tools to present instructional content. Although Mary's classroom management sometimes made it difficult for all of her students to participate in blended learning activities, many of her students appeared engaged in their learning during classroom observations. Mary's lessons were largely formulaic, with stations being the predominant learning modality, and she did not significantly alter her instruction during the 3 months of observations. Mary expressed confidence in her blended learning implementation and in her ability to engage her students via technology. As Mary implemented blended learning, she was motivated to continue her efforts when she saw her students respond positively. "I'm not afraid anymore. It is [blended learning] something that I just keep doing all the time, and I want to get better at, and I'd like to keep doing [it]" (First Case Study Interview).

Summary of the Cases

The interconnected model of professional growth (Clarke & Hollingsworth, 2002) illuminated that teachers' blended learning implementation was supported by reflection and enactment among each domain, including external influences, teacher decision making, and PD

experiences. Case study participant responses indicated that enactment (i.e., implementation) and reflection, elements from the external domain and the domain of practice are connected to the personal domain of knowledge, beliefs, and attitudes about teaching. Teachers' technology attitudes and beliefs (i.e., personal domain) were impacted by teachers' participation in the blended learning cohort (i.e., external domain) and subsequent implementation of blended learning (i.e., domain of practice).

All case study participants were observed to regularly incorporate blended learning in their classroom instruction. Data analysis showed that participants shared beliefs regarding the efficacy of blended learning in encouraging collaboration, allowing for increased real-world connections, student engagement, differentiation, and student-led instruction. Additionally, participants evinced strong student-centered attitudes and believed that the role of the teacher required adjustment to better meet the needs of 21st century learners. Participants revealed positive technology beliefs, carefully considered relevant student factors when planning instruction, praised the instructional differentiation opportunities possible via blended learning, and routinely turned to their TISs for instructional technology planning and support. Noted implementation challenges included student device and infrastructure concerns, a disconnect between the expectations of school administrators and the realities of student and teacher needs, and time availability required to successfully implement technology.

Each case study participant was influenced by student factors and carefully considered relevant student characteristics prior to instruction, which is similar to the study by Parmigiani (2012) in which teachers' decisions were largely driven by the individual instructional needs of their students. Alice, for example, sought to use technology to provide her students with real-world examples of scientific issues studied during face-to-face instruction. Julianne was focused

on helping her students produce with technology and encouraged her students to experiment with multiple technologies to find the tool that worked best to support their innovation. Mary valued the technology capabilities that allowed her diverse learners to access instructional materials at their individual learning levels. The student-centered focus of the three case study participants directed their blended learning instructional planning and aided them in determining opportunities for differentiation.

The case study participants perceived increased opportunities for differentiation of student instruction due to blended learning implementation. Alice utilized a teacher-directed approach when implementing blended learning lessons, which runs counter to recommendations that students benefit from self-directed learning opportunities and group work when participating in a blended learning environment (Wicks et al., 2015). Similar to Alice, Mary circulated through the classroom to provide direct instruction to students who needed further support. Julianne, however, offered increased student choice in differentiating learning as she provided her students with a variety of technology tools and allowed them to choose which tool to use to demonstrate their understanding of content material.

It is interesting to note that Alice and Mary, who allowed less opportunity for student-led instruction, both exhibited substantial classroom management concerns. It was unclear whether the frequent student misbehavior was due to the specific blended learning lessons or to Alice and Mary's own challenges in managing their students' frequent off-task behaviors. Alice attempted to flip her classroom instruction but her efforts were stymied by her students' lack of work at home in addition to classroom management concerns during class. In contrast, Julianne's instruction was marked by student choice and her students did not exhibit the same behavioral challenges during blended learning activities. Mary found it challenging to reconcile the

competing priorities of stations once per week, her need to prepare her students for mandatory state assessments, technology expectations, and the unique needs of her students. Other participants who did not have assessment requirements did not express concerns regarding technology use expectations and standardized testing.

Despite their different approaches to instructional technology implementation, all three participants spoke enthusiastically about their school's TISs and their role in supporting teachers' blended learning implementation. Alice specifically praised the inventiveness of her TISs in finding new technology resources for her to try. Mary shared that she felt her TISs were well versed in instructional technology knowledge and that she routinely consulted her TISs regarding any technology questions. Despite this frequent consultation, Mary had difficulty in differentiating between technology integration and blended learning as a form of technology integration. Rather, Mary often used the two terms interchangeably. She could have benefitted from increased practice with technology concepts with her peers or with her TISs. Julianne agreed that the TIS were central to her technology implementation process, stating that she routinely tried to include her TISs when she was working with a new technology tool to reduce her learning curve. Additionally, Julianne frequently invited the TISs into her classroom to help her implement new technology tools.

Although all three case study participants spoke positively regarding the school culture in their buildings and the supportive nature of their respective school administrators, individual participants noted concerns regarding student device management, discontinuity between administrative expectations and student needs, and time constraints with regard to technology implementation. Alice shared her concerns regarding the school division's Chromebook roll out during the 2016-2017 school year and subsequent device management, including her frustration

with the school's Wi-Fi network. Mary noted perceived gaps between the expectations of her school administrators and the realities faced by both students and teachers. She pointed out that many of her students lacked the requisite resources at home, such as reliable Internet access, to complete assignments. Although students were allowed to check out personal Wi-Fi networks to use at home, there were not enough Wi-Fi devices for all students. Mary also was frustrated by the seemingly unending series of tools, systems, and practices she was expected to master each school year. Mary tried to keep up with administrative expectations but became less motivated to do so when she observed that there was little accountability from her administrators.

Connections to Prior Literature

Comparing the results of the current study to the literature discussed in Chapter 2 yielded both alignments and contradictions. The barriers to teachers' successful incorporation of technology in the classroom setting, whether first-order or second-order, have the potential to inhibit teachers' effective use of instructional technology (Ertmer, 2005). Given the plentiful technology access and technology support in the school division, access to technology was not germane to the context of this study. Similarly, there were numerous opportunities available for relevant and embedded technology PD offerings and participants positively described their school cultures. Commonly reported second-order barriers did not hinder the case study participants, as they were each recommended for blended learning cohort inclusion based on their above-average technology implementation, self-efficacy beliefs, and their technology knowledge.

The individual school environment can play a central role in shaping teachers' technology beliefs and practices (Perrotta, 2013) and the role of the school leader is essential in establishing time for teachers to learn to use technology (Lu & Overbaugh, 2009). Alice and

Julianne shared that their school cultures were positive and that their administrators supported their efforts to implement technology to support student learning. The administrators at SCMS and VVMS provided protected time for their teachers' to participate in the blended learning cohort during the school day. Support for technology innovation from school administrators had the potential to reduce the impact of time as a barrier to technology implementation according to Lu and Overbaugh (2009).

Case study participants, however, did note the first-order barrier of time as a persisting impediment to their blended learning implementation following blended learning cohort participation. Mary shared her feelings that greater time for technology exploration was needed during the blended learning cohort sessions so that cohort members could take the time to collaborate together and to experiment with new technology tools before they attempted to introduce these tools in their classrooms. Wachira and Keengwe's (2011) research supported this concept of teachers needing "time to learn, time to plan, time to collaborate with other teachers" (Wachira & Keengwe, 2011, p. 23).

Though the barrier of time will not alone make a difference in teachers' effective use of technology, Ottenbreit-Leftwich et al. (2018) note that the greater experience teachers have with using technology in the classroom, the stronger their self-efficacy beliefs and attitudes toward technology integration will be. The development of this experience requires an investment of time. Julianne expressed her concerns regarding time as she considered the substantial time commitment that blended learning experimentation required. "You have to dedicate a large amount of time to play with the [technology] program if it's unfamiliar to you" (First Case Study Interview). This perspective is supported by the literature by Benson et al. (2011) who noted that blended learning implementation required considerable time and felt that time concerns should

be addressed early in the implementation process. Julianne remained motivated to implement blended learning, though, due to her beliefs regarding the efficacy of blended learning in supporting student creativity and innovation. Indeed, Benson et al. (2011) assert that faculty members are more likely to use technology when the benefits are readily apparent.

Although the student learning benefits of technology integration may be clear, classroom management may hinder technology use. The barrier of classroom management also emerged with participant interviews as Alice and Mary, despite their technical skills, struggled with classroom management and the management of student behavior requiring additional time. This concept was supported by the literature; Dunleavy et al. (2007) stated that without teachers' strong class management skills, technology simply adds "another layer of management complexity that is possibly overwhelming" (p. 449). Alice struggled to effectively flip her classroom instruction, due in part to her classroom management. Flipping the classroom, however, requires good classroom management in addition to strong technical skills (Irby, 2017). The unique environments of 1:1 settings can increase classroom management challenges (Ottenbreit-Leftwich et al., 2018) if proper attention is not given to revised classroom management techniques. It is essential that teachers are aware of distractions that are specific to 1:1 environments in order to develop strategies to reduce distractions and improve classroom management (Irby, 2017).

To understand the benefits of effectively implemented technology, teachers require tailored PD opportunities (An & Reigeluth, 2012; Dunleavy et al., 2007; Jones & Dexter, 2014; Topper & Lancaster, 2013). The blended learning cohort featured dedicated time for technology experimentation specific to participants' interests, which was a recommendation by An and Reigeluth (2012). Additionally, the structure of the blended learning cohort, which provided

participants with recurring opportunities for collaboration, was supported by both Gunn and Hollingsworth (2013) and Jones and Dexter (2014). Both studies noted recurring technology collaboration opportunities as beneficial in subsequent implementation of technology.

Both Hughes and Ooms (2004) and Jones and Dexter (2014) advocated for a technology integrator to work closely with teachers and ideally participate in technology PD sessions. This recommendation aligned with the structure of the blended learning cohort, which was co-facilitated by building TISs and blended learning coaches. Cohort participants spoke positively regarding technology implementation support from building TISs during and after cohort participation. Although the TISs were established faculty members and, therefore, well known to the participants, the blended learning coaches were hired specifically to aid in the division-wide blended learning implementation. Hughes and Ooms (2004) suggest that outside facilitators with experience in technology innovation could provide unique perspectives for PD attendees.

Professional development should be tailored to the specific needs of each participant. Jones and Dexter (2014) recommend that technology PD sessions be structured in a manner that provides more opportunities for participation, such as considering virtual options. The blended learning cohort offered synchronous and asynchronous sessions to encourage maximum participation, and participants commented favorably during the individual interview regarding the cohort structure. Allowing participants a choice regarding synchronous or asynchronous cohort participation was recommended by Vaughan and Garrison (2006), who suggested that blending the PD approach had the potential to support attendees in the sharing of blended learning and technology implementation ideas.

Technology use should not be the primary goal. Julianne's statement regarding technology tools illustrated this issue. Julianne stated that the technology tool was the first item

she considered, instead of a particular lesson in which she could use the tool to support student learning (First Case Study Interview). Julianne's practice of thinking of the technology tool first and then plugging it into the lesson appears backward. Technology use, however, may be driven by a teacher's desire to innovate and "the novelty factor may encourage a tool-first approach in which technology adoption overshadows pedagogical concerns and strategies" (Dennen, Bruner, & Cates, 2018, p. 156). Rather than using technology as a novelty item, teachers' priorities should be focused on pedagogy and students' learning, with technology being used to support these goals (Keengwe et al., 2012). Additionally, technology PDs must educate teachers regarding how to develop appropriate technology practices to better ensure meaningful student learning (Keengwe et al., 2012). Scaffolding of instruction is one method for increasing participants' collaborative practices and technology implementation (Hughes, 2005). Alice would have preferred a scaffolded approach during cohort instruction because she was frustrated by having to wait for her less technologically capable peers.

Collaborative learning communities of teachers have the potential to support teachers' decision-making processes by empowering teachers to use technology (Shinas & Steckel, 2017). Similarly, school leaders who support collaborative and cooperative environments can see positive results in teacher and student beliefs and behaviors (Bradley-Levine et al., 2014; Kelley et al., 2005; McKinney et al., 2015). School administrators at SCMS and VVMS were perceived to be supportive in the creation of these collaborative environments due to their encouragement of teachers' participation in the blended learning cohort and teachers' subsequent implementation efforts. As noted in her first case study interview, the availability of these opportunities was central to Alice's decision to participate in technology PD offerings such as the blended learning cohort.

Finally, curriculum requirements have been shown to influence teachers' decision-making practices (Perfecto, 2012). Julianne commented that the freedom from standardized testing requirements allowed her to consider technology activities that allowed her students to "be innovators" (First Case Study Interview). In contrast, Mary's subject area of language arts was a tested area, which limited the time she felt she could spend on technology innovation. During her individual interview, Mary stated that she was significantly constrained due to the need to prepare her students for standardized assessments.

Limitations and Implications for Practice and Research

There were several limitations and related implications for practice and research. One limitation was that the population was restricted to the 13 teachers who completed the yearlong blended learning cohort PD program at the middle school level. The small number of participants for final analysis was expected, and participants were purposively sampled, which was also seen in other qualitative case studies of teachers' technology use (e.g., Benson et al., 2011; Darojat, 2016). Although the purpose of sampling in quantitative research is generalizability, qualitative research uses purposive sampling to select information-rich cases that will "illuminate the questions under study" (Patton, 1990, p. 169). Incorporating mixed methods research such as a triangulating classroom management statements within interview with a survey or studying participants in elementary or high school settings, however, could extend the research. Additionally, incorporating quantitative measures such as the Stages of Adoption Technology survey (Christensen, 2002) or the LoTi Digital Age Survey for Teachers (Moersch, 2002) could help better understand teachers' levels of technology readiness prior to study participation.

The method of data analysis, theoretical thematic analysis (Braun & Clarke, 2006), may constitute a limitation. According to Braun and Clarke (2006), theoretical thematic analysis is

often less of "a rich description of the data overall", and more a "detailed analysis of some aspect of the data" (p. 12). When research questions are developed in advance, theoretical thematic analysis is more appropriate. When research questions are to be developed through the process of data analysis, an inductive approach would be more typical.

Similarly, a longitudinal study could better capture teachers' ability to integrate technology and classroom management practices before, during, and after PD participation. Observing teachers over time could allow for the investigation of possible changes in classroom management practices as teachers' incorporate technology. A longitudinal study could also allow for the exploration of changes in pedagogical beliefs related to instructional technology use in the classroom, which could lead to new insights. Furthermore, the adoption of a longitudinal approach could examine patterns over time and illuminate the potential effectiveness of blended learning implementation.

Although scaffolding and differentiation of instruction were noted in the literature as useful in providing depth of instruction (Hughes, 2005), the PD delivery was not scaffolded or differentiated for cohort members. Rather, all PD members received the same instruction. It is suggested that subsequent blended learning cohorts seek to provide opportunities for differentiation of learning opportunities according to individual participant's learning needs and technology abilities. This scaffolding of content has the potential to better engage participants (Hughes, 2005). Consideration should be given to teachers' initial level of technology self-efficacy prior to the development of technology PD opportunities. Individuals tasked with teachers' technology instruction should assess participants and design PD sessions based upon the data received. PD offerings should challenge participants to consider the reasons for technology use and provide embedded opportunities for teachers to evaluate diverse technologies

when considering how best to support students' learning objectives. Teachers should also be allowed opportunities to select technology that they believe will best meet their instructional needs and their student learning objectives. Discussion related to effective classroom and technology management should be incorporated in technology PD offerings to better prepare teachers for technology implementation following PD participation. Future research and study of technology PD may expose educational opportunities to assist teachers in the development of these competencies.

Several implications for practice and research are related to the design of the blended learning cohort, including the time available for technology exploration. As each collaborative technology tool was only introduced briefly during cohort sessions, it is unclear if there was satisfactory instruction to support sufficient knowledge and understanding regarding the tools' potential. Teachers seeking to implement technology need embedded and sustained opportunities for collaborative experimentation (An & Reigeluth, 2012; Gunn & Hollingsworth, 2013; Jones & Dexter, 2014). It is recommended that future blended learning cohorts occur within the school day, provide options for teacher participation, and offer opportunities for technology collaboration. Depending on the specific middle school and subject area taught, case study participants had varying levels of protected time available for technology experimentation. Dedicated time to plan lessons, collaborate with colleagues, and participate in PD offerings is necessary for technology implementation (Wachira & Keengwe, 2011). Teachers should be provided with protected time (i.e., free from other instructional obligations) to afford the opportunity to engage in sustained technology practice and use. Additionally, incorporating video lesson feedback and peer observation opportunities (Al-Awadi & Alghazo, 2012) could benefit future cohort participants. Similarly, it would be valuable to extend the research to

include observations of TIS and teacher collaboration to explore the relationship between TISs and teachers.

Another recommendation for practice is related to the extensive reliance of participants on their TISs for resources, lesson planning, and support when implementing technology lessons. Including technology coaches, integrators, and facilitators in schools and in positions designed to support teachers' technology implementation is central to teachers' technology use (Hughes & Ooms, 2004; Jones & Dexter, 2014; Klieger et al., 2010). Within the study context, TISs were hired at the division level and then allocated to individual schools. As teachers seem willing to open themselves up to the support of their TISs, it is essential that the individuals who hold these positions have strong instructional and technology backgrounds so that they can support teachers' technology innovation efforts. Additionally, the individuals responsible for hiring TISs should be apprised of the importance of this role in supporting teachers' technology implementation and innovation.

A final recommendation for practice is that technology PDs be restructured to better address post-PD student learning impacts. Effective classroom management is essential for successful integration of technology concepts (Lim et al., 2005) and is also central to the overall functioning of instructional settings. Therefore, it is necessary that technology PDs include effective student behavior management of technology-supported learning in order to support teachers' technology implementation. Student learning is less meaningful without the development of appropriate computing practices (Keengwe et al., 2012), which suggests a need for teachers to be trained in how to best implement technology with students. Additionally, teachers' technology PDs should comprise instruction in how to effectively evaluate different technologies to better identify which technologies best support specific learning objectives.

Technology integration can result in paradigm shifts in the classroom (Christensen & Knezek, 2017) and it is essential that teachers be adequately prepared to address these shifts. Teachers should be able to identify a distinct purpose for the use of technology and how to communicate that purpose to students with clear technology use expectations and specific learning outcomes. Proactive technology implementation influences students' technology use (Keengwe et al., 2012), making it imperative that technology PD is responsive to teachers' needs and provide teachers with the skill to achieve these technology aims. Effective PD related to technology integration can lead to meaningful student learning. Keengwe et al. (2012).

Conclusion

This descriptive case study examined the blended learning implementation of three middle school teachers following their participation in an embedded blended learning PD program. Although there is a deficit of blended learning literature at the secondary level, this study will contribute to expanding knowledge related to secondary teachers' implementation of blended learning. Additional research, however, is still necessary to explore the ways in which blended learning can be leveraged at the secondary level to support teachers' objectives for student learning. Continued research related to how teachers' can best manage students' classroom behaviors when implementing blended learning is also suggested.

Case study participants believed their blended learning implementation efforts had a positive impact on student learning. Findings revealed that participants felt blended learning implementation engaged students, extended student learning opportunities, and supported 21st century learning goals. Participants shared that their use of blended learning allowed for differentiation of instruction, promoted student-centered teaching, and provided opportunities for real-world curriculum connections. Teachers evinced positive perceptions regarding their

classroom technology use and reported increased student engagement related to their blended learning efforts. Though participants noted implementation challenges, they recognized the benefits of participation in a collaborative technology community dedicated to technology acquisition and blended learning implementation.

The findings indicated that when planning a cohort model for instructional technology PD that is aimed at supporting teachers who seek to implement blended learning in their classrooms, special focus should be placed on creating a collaborative technology community. Establishing a technology community and technology facilitation support (e.g., a building-level TIS) can provide resources and solutions to teachers' immediate needs. As teachers participate in PD offerings related to blended learning implementation, it is imperative that they be provided with opportunities to develop appropriate classroom and technology management strategies that will support effective technology integration. Additionally, it is important to maintain continuity of technology expectations at the school division level, school level, and department level to sustain teachers' technology integration. Technology PD opportunities that are recursive and embedded can better assist teachers' technology implementation efforts. Authentic and thoughtful application of technology in the classroom has the potential to transform teaching and learning. Teacher's efforts to facilitate and enhance learning through technology should be encouraged and supported.

References

Al-Awadi, H. M., & Alghazo, I. M. (2012). The effect of student teaching experience on preservice elementary teachers' self-efficacy beliefs for technology integration in the UAE. *Educational Technology Research & Development, 60*(5), 923-941. doi:10.1007/s11423-012-9239-4

Altheide, D. L. & Johnson, J. M. (1994). Criteria for assessing interpretive validity in qualitative research. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research*. Thousand Oaks, CA: Sage.

An, Y., & Reigeluth, C. (2012). Creating technology-enhanced, learner-centered classrooms: K-12 teachers' beliefs, perceptions, barriers, and support needs. *Journal of Digital Learning in Teacher Education, 28*(2), 54-62. doi:10.1080/21532974.2011.10784681

Arbaugh, J. B., Cleveland-Innes, M., Diaz, S. R., Garrison, D. R., Ice, P., Richardson, & Swan, K. P. (2008). Developing a community of inquiry instrument: Testing a measure of the Community of Inquiry framework using a multi-institutional sample. *The Internet and Higher Education*, *11*(3-4), 133-136. doi:10.1016/j.iheduc.2008.06.003

Archambault, L., & Crippen, K. (2009). Examining TPACK among K–12 online distance educators in the United States. *Contemporary Issues in Technology and Teacher Education, 9*(1), 71–88.

Badia, A., Meneses, J., & Sigalés, C. (2013). Teachers' perceptions of factors affecting the educational use of ICT in technology-rich classrooms. *Electronic Journal of Research in Educational Psychology, 11*, 787-807. doi:10.14204/ejrep.31.13053

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. (1997). Self-efficacy: The exercise of control. New York: W.H. Freeman and Company.

Bauer, J., & Kenton, J. (2005). Technology integration in the schools: Why it isn't happening. *Journal of Technology and Teacher Education, 13*, 519-546. Retrieved from https://www.aace.org/pubs/jtate/

Becker, H. J., & Anderson, R. E. (1998). Teaching, learning, and computing: 1998, A national survey of schools and teachers describing their best practices, teaching philosophies, and uses of technology. Retrieved October 15, 2016, from https://msu.edu/course/cep/807/*cep240studyrefs/becker1998summary.pdf

Benson, V., Anderson, D., & Ooms, A. (2011). Educators' perceptions, attitudes and practices: Blended learning in business and management education. *Research in Learning Technology, 19*(1), 143-154. doi:10.1080/21567069.2011.586676

Boelens, R., De Wever, B., & Voet, M. (2017). Four key challenges to the design of blended learning: A systematic literature review. *Educational Research Review*, *22*, 1-18.

Bradley-Levine, J., Mosier, G., & Perkins, T. (2014). Perceptions of teacher leadership within the new tech high school model. *International Journal of Teacher Leadership, 5*(1), 1-18. Retrieved from: http://www.jielusa.org/

Brannan, T. (2016). MOOCS in a blended learning continuum. *Training, 30*(5), 20-26.

Brantlinger, E., Jimenez, R., Klingner, J., Pugach, M., & Richardson, V. (2005). Qualitative studies in special education. *Council for Exceptional Children*, *71*(5), 195-207. doi: 10.1177/001440290507100205

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77-101. doi:10.1191/1478088706qp063oa

Brown, M. G., (2016). Blended instructional practice: A review of the empirical literature on instructors' adoption and use of online tools in face-to-face teaching. *Internet & Higher Education, 31*, 1-10. doi:10.1016/j.iheduc.2016.05.001

Bungum, B. (2006). Transferring and transforming technology education: A study of Norwegian teachers' perceptions of ideas from design & technology. *International Journal of Technology and Design Education, 16*(1), 31-52. doi:10.1007/s10798-005-2111-7

Carver, L. (2016). Teacher perception of barriers and benefits in K-12 technology usage. *Turkish Online Journal of Educational Technology, 15*(1), 110-116. Retrieved from http://www.tojet.net/

Christensen, R. (2002). Impact of technology integration education on the attitudes of teachers and students. *Journal of Research on Technology in Education, 34*(4), 411-434.

Clark, K. (2006). Practices for the use of technology in high schools: A Delphi study. *Journal of Technology & Teacher Education, 14*, 481-499. Retrieved from: https://www.learntechlib.org/

Clarke, D., & Hollingsworth, H. (2002). Elaborating a model of teacher professional growth. *Teaching and Teacher Education*, 18, 947-967. doi:10.1016/s0742-051x(02)00053-7

Creswell, J. (2009). *Qualitative inquiry and research design: Choosing among five approaches* (2nd ed.). Thousand Oaks, CA: Sage. doi:10.1086/317417

Dalal, M., Archambault, L., & Shelton, C. (2017). Professional Development for International Teachers: Examining TPACK and Technology Integration Decision Making. *Journal of Research on Technology in Education*, *49*(3-4), 117-133.

Darojat, O. (2016). Improving curriculum through blended learning pedagogy. *Turkish Online Journal of Distance Education (TOJDE), 17*(4), 203-218. Retrieved from: http://www.tojet.net

Demir, K. (2008). Transformational leadership and collective efficacy: The moderating roles of collaborative culture and teachers' self-efficacy. *Eurasian Journal of Educational Research*, *33*, 93-112. Retrieved from: http://ejer.com

Dennen, V. P., Burner, K. J., & Cates, M. L. (2018). Information and communication technologies, and learning theories: Putting pedagogy into practice. *Second Handbook of Information Technology in Primary and Secondary Education*, 143-160. doi:10.1007/978-3-319-71054-9_9

Dewey, J. (1933). *How we think: A restatement of the relation of reflective thinking to the educative process (Rev. ed).* Boston, MA: D.C. Heath.

Dewey, J. (1959). My pedagogic creed. In J. Dewey, *Dewey on education* (pp. 19-32). New York, NY: Teachers College Press.

Dexter, S. (2011). School technology leadership: Artifacts in systems of practice. *Journal of School Leadership, 21*, 166-189. Retrieved from: http://www.rowman.com/Page/JSL

Donovan, L., Hartley, K., & Strudler, N. (2007). Teacher concerns during initial implementation of a one-to-one laptop initiative at the middle school level. *Journal of Research on Technology in Education, 39*, 263-286. doi:10.1080/15391523.2007.10782483

Dunleavy, M., Dexter, S., & Heinecke, W. (2007). What added value does a 1:1 student to laptop ratio bring to technology-supported teaching and learning? *Journal of Computer Assisted Learning, 23*, 440-452. doi:10.1111/j.1365-2729.2007.00227.x

Emmer, E.T. (2001). Classroom management: A critical part of educational psychology, with

implications for teacher education. *Educational Psychologist, 36*(2), 103-113.

Ertmer, P. (1999). Addressing first- and second-order barriers to change: Strategies for technology integration. *Educational Technology, Research and Development, 47*(4), 47-61. doi:10.1007/BF02299597

Ertmer, P. (2005). Teacher pedagogical beliefs: The final frontier in our quest for technology integration? *Educational Technology Research & Development, 53*(4), 25-39. doi:10.1007/BF02504683

Ertmer, P.A., & Newby, T.J. (1993). Behaviorism, cognitivism, constructivism: comparing critical features from an instructional design perspective. *Performance Improvement Quarterly*, *6*(4), 50-72. doi:10.1111/j.1937- 8327.1993.tb00605.x

Ertmer, P., Ottenbreit-Leftwich, A., Sadik, O., Sendurur, E., & Sendurur, P. (2012). Teacher beliefs and technology integration practices: A critical relationship. *Computers & Education, 59*, 423-435. doi:10.1016/j.compedu.2012.02.001

Flick, U. (2009). *An introduction to qualitative research* (4th ed.). London, England: Sage.

Frank, K., Zhao, Y., & Borman, K. (2004). Social capital and the diffusion of innovations within organizations: The case of computer technology in schools. *Sociology of Education, 77*, 148-171. doi:10.1177/003804070407700203

Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education model. *The Internet and Higher Education*, 2(2-3), 87-105. doi:10.1016/S1096-7516(00)00016-6

Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *Internet & Higher Education, 7*(2), 95-105. doi:10.1016/j.iheduc.2004.02.001

Garrison, D.R., & Vaughan, N.D. (2011). Blended learning in higher education: Framework, principles, and guidelines. San Francisco, CA, US: Jossey-Bass.

Glassett, K., & Schrum, L. (2009). Teacher beliefs and student achievement in technology-rich classroom environments. *International Journal of Technology in Teaching and Learning*, 5, 138-153.

Graham, C., Woodfield, W., & Harrison, J. (2013). A framework for institutional adoption and implementation of blended learning in higher education. *Internet & Higher Education, 18*, 4-14. doi:10.1016/j.iheduc.2012.09.003

Gunn, T. M., & Hollingsworth, M. (2013). The implementation and assessment of a shared 21st century learning vision: A district-based approach. *Journal of Research on Technology in Education (International Society for Technology in Education), 45*, 201-228. doi:10.1080/15391523.2013.10782603

Hakverdi-Can, M., & Dana, T. (2012). Exemplary science teachers' use of technology. *Turkish Online Journal of Educational Technology, 11*(1), 94-112. Retrieved from: http://www.tojet.net/

Harris, J. B., & Hofer, M. J. (2011). Technological pedagogical content knowledge (TPACK) in action: A descriptive study of secondary teachers' curriculum-based, technology-related instructional planning. *Journal of Research on Technology in Education, 43*, 211-229. doi:10.1080/15391523.2011.10782570

Harris, J., Mishra, P., & Koehler, M. (2009). Teachers' technological pedagogical content knowledge and learning activity types: Curriculum-based technology integration reframed. *Journal of Research on Technology in Education, 41*, 393-416. doi:10.1080/15391523.2009.10782536

Hartnell-Young, E. (2006). Teachers' roles and professional learning in communities of practice supported by technology in schools. *Journal of Technology and Teacher Education, 14*, 461-480.

Hechter, R., & Vermette, L. (2014). Tech-savvy science education? Understanding teacher pedagogical practices for integrating technology in K-12 classrooms. *Journal of Computers in Mathematics & Science Teaching, 33*(1), 27-47.

Hew, K., & Brush, T. (2007). Integrating technology into K-12 teaching and learning: Current knowledge gaps and recommendations for future research. *Educational Technology Research & Development, 55*, 223-252. doi:10.1007/s11423-006-9022-5

Hsu, P. (2016). Examining current beliefs, practices and barriers about technology integration: A case study. *TechTrends, 60*(1), 30-40. doi:10.1007/s11528-015-0014-3

Hughes, J. (2005). The role of teacher knowledge and learning experiences in forming technology-integrated pedagogy. *Journal of Technology and Teacher Education, 13*, 277-302. Retrieved from: http://www.aace.org/pubs/jtate/default.htm

Hughes, J. E., & Ooms, A. (2004). Content-focused technology inquiry groups: Preparing urban teachers to integrate technology to transform student learning. *Journal of Research on Technology in Education, 36*, 397-411. doi:10.1080/15391523.2004.10782422

Hulpia, H., Devos, G., & Van Keer, H. (2011). The relation between school leadership from a distributed perspective and teachers' organizational commitment: Examining the source of the leadership function. *Educational Administration Quarterly, 47*, 728-771. doi:10.1177/0013161X11402065

Inan, F. A. & Lowther, D. L. (2010). Factors affecting technology integration in K-12 classrooms: a path model. *Educational Research, Technology and Development, 58,* 137-154: doi: 10.1007/s11423-009-9132-y

International Society for Technology in Education. (2008). NETS for teachers. Retrieved January 2, 2019, from http://www.iste.org/standards/for-educators

Irby, David R., "Middle School Student and Teacher Perceptions About the Effectiveness of the Technology Integration in the Classroom" (2017). *Dissertations*. 646. https://irl.umsl.edu/dissertation/646

Jacobs, J., Gregory, A., Hoppey, D., & Yendol-Hoppey, D. (2009). Data literacy: Understanding teachers' data use in a context of accountability and response to intervention. *Action in Teacher Education, 31*(3), 41-55.

Jimison, P. (2011). Effective blended learning environments. *College and University Media Review, 17,* 59-68.

Johnson, L., Adams Becker, S., Estrada, V., & Freeman, A. (2015). *NMC Horizon Report: 2015 K-12 Edition*. Austin, TX: The New Media Consortium.

Jones, W., & Dexter, S. (2014). How teachers learn: The roles of formal, informal, and independent learning. *Educational Technology Research & Development, 62*, 367-384. doi:10.1007/s11423-014-9337-6

Keengwe, J., Schnellert, G., & Mills, C. (2012). Laptop initiative: Impact on instructional technology integration and student learning. *Education and Information Technologies, 17*(2), 137-146. doi:10.1007/s10639-010-9150-8

Kim, C., Kim, M., Lee, C., Spector, J., & DeMeester, K. (2013). Teacher beliefs and technology integration. *Teaching & Teacher Education, 29*(1), 76-85. doi:10.1016/j.tate.2012.08.005

Klieger, A., Ben-Hur, Y., & Bar-Yossef, N. (2010). Integrating laptop computers into classroom: Attitudes, needs, and PD of science Teachers—A case study. *Journal of Science Education & Technology, 19*(2), 187-198. doi:10.1007/s10956-009-9191-1

Kohler, F., Henning, J. E., & Usma-Wilches, J. (2008). Preparing preservice teachers to make instructional decisions: An examination of data from the teacher work sample. *Teaching & Teacher Education, 24*, 2108-2117. doi:10.1016/j.tate.2008.04.002

Kouzes, J. M., & Posner, B. Z. (2002). *The Jossey-Bass business and management series. The leadership challenge (3rd ed.).* San Francisco, CA, US: Jossey-Bass.

Krieger, S. (1985). Beyond subjectivity: The use of the self in Social Science. *Qualitative sociology*. *8*, 309-324. doi:10.1007/BF00988842

Lave, J., & Wenger E. (1991) *Situated learning: Legitimate peripheral participation*. New York, NY: Cambridge University Press.

Li, S., & Choi, T. (2014). Does social capital matter? A quantitative approach to examining technology infusion in schools. *Journal of Computer Assisted Learning, 30*(1), 1-16. doi:10.1111/jcal.12010

Lim, C., & Khine, M. (2006). Managing teachers' barriers to ICT integration in Singapore schools. *Journal of Technology & Teacher Education, 14*(1), 97-125. Retrieved from: http://www.aace.org/pubs/jtate/default.htm

Lim, C. P., Pek, M. S., & Chai, C. S. (2005). Classroom management issues in information and communication technology (ICT)-mediated learning environments: Back to the basics. *Journal of Educational Multimedia & Hypermedia, 14*(4), 391-414.

Lipman, M. (1991). *Thinking in education*. Cambridge, MA: Cambridge University Press.

Lu, R., & Overbaugh, C. (2009). School environment and technology implementation in K-12 classrooms. *Computers in the Schools, 26*(2), 89-106. doi:10.1080/07380560902906096

McKinney, C., Labat, M., & Labat, C. (2015). Traits possessed by principals who transform school culture in national blue ribbon schools. *Academy of Educational Leadership Journal, 19*, 152-166.

Merriam, S. B. (1988). *Case study research in education: A qualitative approach*. San Francisco: Jossey-Bass.

Merriam, S. B. (2002). *Qualitative research in practice: Examples for discussion and analysis.* San Francisco, CA: Jossey-Bass.

Mishra, P., & Koehler, M. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record, 108*, 1017-1054. doi:10.1111/j.1467-9620.2006.00684.x

Moe, C., & Rye, S. (2011). Blended learning: Communication, locations and work-life practices. *Educational Media International, 48*, 165-178. doi:10.1080/09523987.2011.607320

Moersch, C. (2002). *Beyond hardware: Using existing technology to promote higher level thinking*. Gloucester, MA: International Society For Technology In Education (ISTE).

Mouza, C. (2002). Learning to teach with new technology: Implications for PD. *Journal of Research on Technology in Education, 35*, 272-289. doi:10.1080/15391523.2002.10782386

Mullen, C., & Hutinger, J. (2008). The principal's role in fostering collaborative learning communities through faculty study group development. *Theory into Practice, 47*, 276-285. doi:10.1080/00405840802329136

Nastasi, B. K., & Schensul, S. L. (2005). Contributions of qualitative research to the validity of intervention research. *Journal of School Psychology*, *43,* 177-195. doi: 10.1016/j.jsp.2005.04.003

Ottenbreit-Leftwich, A., Glazewski, K., Newby, T., & Ertmer, P. (2010). Teacher value beliefs associated with using technology: Addressing professional and student needs. *Computers & Education, 55*, 1321-1335. doi:10.1016/j.compedu.2010.06.002

Ottenbreit-Leftwich, A., Liao, J. Y.-C., Sadik, O., & Ertmer, P. (2018). Evolution of teachers' technology integration knowledge, beliefs, and practices: How can we support beginning teachers use of technology? *Journal of Research on Technology in Education*, 1-23. doi:10.1080/15391523.2018.1487350

Otto, T., & Albion, P. (2004, March). *Principals' beliefs about teaching with ICT.* Paper presented at the International Conference of the Society for Information Technology and Teacher Education, Atlanta, GA. Retrieved from https://core.ac.uk/download/files/333/11040077.pdf

Pape, L., Sheehan, T., & Worrell, C. (2012). How to do more: Lessons from online learning. *International Society for Technology in Education: Learning & Leading with Technology*, *39*, 18-22.

Parmigiani, D. (2012). Teachers and decision-making processes: An Italian exploratory study on individual and collaborative decisions. *Canadian Journal of Education, 35*(1), 171-186.

Partnership for 21st Century Skills. (2016). *Framework for 21st century learning*. Retrieved from http://www.p21.org/our-work/p21-framework

Partnership for 21st Century Skills. (2009). *P21 framework definitions*. Retrieved from http://www.p21.org/storage/documents/P21_Framework_Definitions.pdf

Patton, M. (1990). *Qualitative evaluation and research methods.* Beverly Hills, CA: Sage.

Perfecto, M. R. G. (2012). Contextual factors in teacher decision making: Extending the woods model. *Asia-Pacific Education Researcher (De La Salle University Manila), 21*, 474-483.

Perrotta, C. (2013). Do school-level factors influence the educational benefits of digital technology? A critical analysis of teachers' perceptions. *British Journal of Educational Technology, 44*, 314-327. doi:10.1111.j.1467-8535.2012.01304.x

Phelps, R., & Graham, A. (2008). Developing technology together, together: A whole-school metacognitive approach to ICT teacher PD. *Journal of Computing in Teacher Education, 24*, 125-134. doi:10.1080/10402454.2008.10784598

Picciano, A., Seaman, J., Shea, P., & Swan, K. (2012). Examining the extent and nature of online learning in American K-12 education: The research initiatives of the Alfred P. Sloan Foundation. *The Internet and Higher Education*, *15*(2), 127-135. doi:10.1016/j.iheduc.2011.07.004

Powell, A., Rabbit, B., & Kennedy, K., (2014). *iNACOL blended learning teacher competency framework*. Retrieved from http://www.inacol.org/wp-content/uploads/2015/02/iNACOL-Blended-Learning-Teacher-Competency-Framework.pdf

Rempel, A. M., & Bentley, R. R. (1970). Relationship with selected factors. *The Journal of Teacher Education 21*, 534-539.

Richardson, J., McLeod, S., Flora, K., Kannan, S., & Sincar, M. (2013). Large-scale 1:1 computing initiatives: An open access database. *International Journal of Education and Development Using Information and Communication Technology, 9*(1), 4-18.

Rodriguez, V. (2013). The potential of systems thinking in teacher reform as theorized for the teaching brain framework. *Mind, Brain, and Education, 7*(2), 77-85. doi:10.1111/mbe.12013

Şahin, S. (2011). The relationship between instructional leadership style and school culture (Izmir case). *Educational Sciences: Theory & Practice, 11*, 1920-1927.

Schnellert, L., Butler. D. L., & Higginson, S. (2008). Co-constructors of data; co-constructors of meaning: Teacher professional development in an age of accountability. *Teaching and Teacher Education, 24*(3), 725-750.

Schommer, M. (1990). Effects' of beliefs about the nature of knowledge on comprehension. *Journal of Educational Psychology, 82*, 498-504. doi:10.1037/0022-0663.82.3.498

Shulman, L. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher*, *15*(2), 4-14. doi:10.2307/1175860

Shulman, L. S. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard Educational Review*, *57*(1), 1-22. doi:10.17763/haer.57.1.j463w79r56455411

Shinas, V. H., & Steckel, B. (2017). Technology integration for the 21st century classroom: Principles for effective planning. *New England Reading Association Journal, 52*(1), 1-6.

Smith, N. (2014). Teaching beyond connectivity: A year comparing blended and face-to-face learning in a secondary classroom. *New Zealand Journal of Teachers' Work, 11*(1), 93-106.

Spires, H., Oliver, K., & Corn, J. (2011). The new learning ecology of one-to-one computing environments: Preparing teachers for shifting dynamics and relationships. *Journal of Digital Learning in Teacher Education, 28*(2), 63-72. Retrieved from: http://www.iste.org

Stake, R. (1995). *The art of case study research*. Thousand Oaks, CA: Sage.

Staker, H., & Horn, M. B. (2012). Classifying K-12 blended learning. Retrieved from http://www.christenseninstitute.org/wpcontent/uploads/2013/04/Classifying-K-12-blendedlearning.pdf

Steckel, B., Shinas, V. H., & Van Vaerenewyck, L. (2015). *Artistic Technology Integration. The Reading Teacher, 69(1), 41–49*.doi:10.1002/trtr.1356

Strauss, A., & Corbin, J. (1998). *Basics of qualitative research: Techniques and procedures for developing grounded theory*. Thousand Oaks, CA: Sage.

Tashakkori, A., & Teddlie, C. (2003). Major issues and controversies in the use of mixed methods in the social and behavioral sciences. In A. Tashakkori & C. Teddlie (Eds.) *Handbook of Mixed Methods in Social and Behavioral Research* (pp. 3-50). Thousand Oaks, CA: Sage.

Taylor, J. (2011). The intimate insider: Negotiating the ethics of friendship when doing insider research. *Qualitative Research, 11*(1), 3-22. doi: 10.1177/1468794110384447

Tondeur, J., van Braak, J., Ertmer, P. A., & Ottenbreit-Leftwich, A. (2017). Understanding the relationship between teachers' pedagogical beliefs and technology use in education: a systematic review of qualitative evidence. *Educational Technology Research and Development*, *65*(3), 555-575.

Topper, A., & Lancaster, S. (2013). Common challenges and experiences of school districts that are implementing one-to-one computing initiatives. *Computers in the Schools, 30*, 346-358. doi:10.1080/07380569.2013.844640

Triggs, P., & John, P. (2004). From transaction to transformation: Information and communication technology, PD and the formation of communities of practice. *Journal of Computer Assisted Learning, 20*, 426-439. doi:10.1111/j.1365-2729.2004.00101.x

Tucker, Catlin R. (2012). *Blended learning in grades 4-12: Leveraging the power of technology to create student-centered classrooms*. Thousand Oaks, CA: Corwin.

Turan, S., & Bektaş, F., (2013). The relationship between school culture and leadership practices. *Eurasian Journal of Educational Research, 52,* 155-168. Retrieved from: http://www.ejer.com.tr

U.S. Department of Education, Office of Educational Technology. (2016). *Future ready learning: Reimaging the role of technology in education* (National Educational Technology Plan 2016). Washington, DC: Author. Retrieved from https://tech.ed.gov/files/2015/12/NETP16.pdf

Vannatta, R., & Fordham, N. (2004). Teacher dispositions as predictors of classroom technology use. *Journal of Research on Technology in Education, 36*, 253-271. doi:10.1080/15391523.2004.10782415

Vaughan, N., & Garrison, D. R. (2006). Creating cognitive presence in a blended faculty development community. *Internet & Higher Education, 8*(1), 1-12. doi:10.1016/j.iheduc.2004.11.001

Wachira, P., & Keengwe, J. (2011). Technology integration barriers: Urban school mathematics teachers perspectives. *Journal of Science Education & Technology, 20*(1), 17-25. doi:10.1007/s10956-010-9230-y

Wang, L., Ertmer, P., & Newby, T. (2004). Increasing preservice teachers' self-efficacy beliefs for technology integration. Journal of Research on Technology in Education, 36(3), 231–

250.

Waldron, N. L., & McLeskey, J. (2010). Establishing a collaborative school culture through comprehensive school reform. *Journal of Educational & Psychological Consultation, 20*(1), 58-74. doi:10.1080/10474410903535364

Wholey, J., Hatry, H., & Newcomer, K. (2010). *Handbook of practical program evaluation*. San Francisco, CA: Jossey-Bass.

Wicks, D. A., Craft, B. B., Mason, G. N., Gritter, K., & Bolding, K. (2015). An investigation into the community of inquiry of blended classrooms by a faculty learning community. *Internet & Higher Education, 25*, 53-62. doi:10.1016/j.iheduc.2014.12.001

Woolfolk, A. E., & Hoy, W. K. (1990). Prospective teachers' sense of efficacy and beliefs about control. Journal of Educational Psychology, *82*(1), 81-91. . doi:10.1037/0022-0663.82.1.81

Wood, B. E. (2013). *What is a social inquiry?* Research Information for Teachers, *3*, 20−28.

Wood, E., Mueller, J., Willoughby, T., Specht, J., & Deyoung, T. (2005). Teachers' perceptions: Barriers and supports to using technology in the classroom. *Education, Communication & Information, 5*(2), 183-206. doi:10.1080/14636310500186214

Yin, R.K. (1981). *Case study research, Design and methods*, Thousand Oaks, CA: Sage.

Yin, R. K. (2003). *Case study research: Design and methods* (3rd ed.). Thousand Oaks, CA: Sage.

Yin, R. K. (2009). *Case study research: Design and methods* (4th ed.). Thousand Oaks, CA: Sage.

Yu, C. (2013). The integration of technology in the 21st century classroom: Teachers' attitudes and pedagogical beliefs toward emerging technologies. *Journal of Technology Integration in the Classroom, 5*(1), 5-11.

Zhu, C. (2013). The effect of cultural and school factors on the implementation of CSCL. *Journal of Educational Technology*, *44*, 484-501. doi:10.1111/j.1467-8535.2012.01333.x

Zorfass, J., & Rivero, H. K. (2005). Collaboration is key: How a community of practice promotes technology integration. *Journal of Special Education Technology, 20*(3), 51-67. Retrieved from: http://jset.unlv.edu

Appendix A

Blended Learning Cohort Activity Chart

Month	Blended Resources	Catlin Tucker Book	Tools
September	iNACOL Blended Learning Teacher Competency Framework, ACPS definition of blended learning		
October	ACPS cohort goals, Blogs - Medina City Schools and ACPS blog in Blackboard	CH 1 - 21st century learning; student-centered classrooms CH 2 - Blended learning; blended models & benefits; community of inquiry	Twitter, Padlet
November	Master Teacher Project, Engagement strategies	CH 3 - Teacher in Blended Learning; facilitator types; weaving online work into classroom	
December	Collaborative blended planning conversations (in person)		VoiceThread, Today's Meet
January	Feedback survey	CH 4 - Asking Questions Online; question types; designing questions; sample questions CH 5 - Developing Online Communities; creating and maintaining a safe space	
February	Blended Models - animated examples	CH 6-9 - Content Resources Discussion board	
March	Blended Research		Cohort created list of blended learning research
April	Blended Exemplars		Playlist, 100 Schools, Foundation for Blended and Online

			Learning
May	Blended Networking		Kathy Schrock (www.schrockguide.net and) and Cybraryman (www.cybraryman.com)

Appendix B

Blended Learning Cohort Recertification Matrix

Strands of Participation	Related Activities
Strand 1 = 35 recertification points	• Attendance at all sessions • Active participation during in-session activities • Completion of pre- and post-session work including reflections
Strand 2 = 50 recertification points	• Complete Strand 1 activities **AND** • Write a guest blog for the Technology & Learning Blog including student samples and/or video
Strand 3 = 75 recertification points	• Complete Strand 1 and 2 activities **AND** • Co-Teach (and Co-Plan) a lesson with TIS OR Facilitate a lesson at Department Meeting **OR** model for a 15-minute session at the Instructional Leadership Team meeting • Conduct a peer observation of a blended learning cohort member
Strand 4 = 100 recertification points	• Complete Strand 1, 2, and 3 activities **AND** • Video tape and reflect on practice **OR** be filmed by the Professional Learning department • Share lesson outside of ACPS in the form of a blog, article, post, etc. **OR** create a "how to" video showcasing a particular technology tool or practice for staff

Appendix C

Summary Matrix

Research Question	**Constructs**	**Measures**	**Data Analysis**
1: What are teachers' perceptions of changes in attitudes and beliefs about instructional practices after a blended learning professional development program?	Teacher attitudes and beliefs, Teacher decision making	Individual interview	Thematic coding
2: How do teachers implement blended learning after a blended learning professional development program?	Teacher attitudes and beliefs, Blended learning implementation	Individual interview, Case study interviews, Classroom observations	Thematic coding
3: What are teachers' decision-making processes when implementing blended learning after a blended learning professional development program?	Teacher decision making, Blended learning implementation	Case study interviews, Classroom observations	Thematic coding

Appendix D

Letter of Informed Consent—Cohort Study

Johns Hopkins University Homewood Institutional Review Board (HIRB)

Informed Consent Form

Title:	Implementation of Blended Learning Following a Professional Development Program: A Case Study
Principal Investigator:	Dr. Sherri Prosser, Johns Hopkins University School of Education
Student Investigator:	Izora Everson, Doctoral Candidate, Johns Hopkins University School of Education
Date:	1/18/2018

PURPOSE OF RESEARCH STUDY:

The purpose of this research study is to examine the experiences and outcomes of teachers in a blended learning cohort professional development program.

We anticipate that approximately 13 individuals will participate in this study.

PROCEDURES:

If you agree to participate, you will be asked to participate in a semistructured interview. The duration of this audio recorded interview will be approximately 45 minutes. After completing this semistructured interview, three to five participants will be selected for inclusion in the case study portion of the research study. Selection for the case study will be determined by your responses to this interview.

RISKS/DISCOMFORTS:

There are no foreseeable risks for participating in this research.

BENEFITS:

There are no direct benefits to you from participating in this study other than to further research in technology education.

This study may benefit the educational field by exploring the experiences of teachers in an embedded professional development program. Additionally, the findings may provide insight into teacher's implementation of blended learning resulting from participation in a blended learning cohort professional development program.

VOLUNTARY PARTICIPATION AND RIGHT TO WITHDRAW:

Your participation in this study is entirely voluntary: You choose whether to participate. If you decide not to participate, there are no penalties, and you will not lose any benefits to which you would otherwise be entitled.

If you choose to participate in the study, you can stop your participation at any time, without any penalty or loss of benefits. If you want to withdraw from the study, please notify the Principal Investigator at any time during the study.

If we learn any new information during the study that could affect whether you want to continue participating, we will discuss this information with you.

CONFIDENTIALITY:

Any study records that identify you will be kept confidential to the extent possible by law. People responsible for making sure that research is done properly, including members of the Johns Hopkins University Homewood Institutional Review Board, may review the records from your participation. Otherwise, records that identify you will be available only to people working on the study, unless you give permission for other people to see the records. The researcher will use pseudonyms for the participants and the school site to protect the privacy of the participants and the school. Interviews will be audiotape recorded and uploaded to a password protected Google Drive folder.

Completed consent forms will be retained for a minimum period of 5 years from the date at which the project is completed. Shredding unwanted documents and permanently deleting all computer files will dispose of data at the end of this time period.

COMPENSATION:

You will not receive any payment or other compensation for participating in this study.

IF YOU HAVE QUESTIONS OR CONCERNS:

You can ask questions about this research study now or at any time during the study, by talking to the researcher working with you or by calling Izora Everson at 703.795.6486.

If you have questions about your rights as a research participant or feel that you have not been treated fairly, please call the Homewood Institutional Review Board at Johns Hopkins University at (410) 516-6580.

SIGNATURES:

WHAT YOUR SIGNATURE MEANS:

Your signature below means that you understand the information in this consent form and that you agree to participate in the study.

By signing this consent form, you have not waived any legal rights you otherwise would have as a participant in a research study.

Participant's Signature	**Date**
Signature of Person Obtaining Consent (Investigator or HIRB Approved Designee)	**Date**

Appendix E

Letter of Informed Consent—Case Study

Johns Hopkins University Homewood Institutional Review Board (HIRB)

Informed Consent Form

Title:	Implementation of Blended Learning Following a Professional Development Program: A Case Study
Principal Investigator:	Dr. Sherri Prosser, Johns Hopkins University School of Education
Student Investigator:	Izora Everson, Doctoral Candidate, Johns Hopkins University School of Education
Date:	1/18/2018

PURPOSE OF RESEARCH STUDY:

The purpose of this research study is to examine the experiences and outcomes of teachers in a blended learning cohort professional development program.

We anticipate that approximately four individuals will participate in this study.

PROCEDURES:

If you agree to participate, you will be asked to take part in two semistructured interviews. The duration of the audio recorded initial interview will be approximately 60 minutes and the duration of the audio recorded follow-up interview will be approximately 30-45 minutes. You will also be asked to allow the researcher to conduct four classroom observations over a 2-month period. The duration of each observation will last approximately 30-45 minutes. You will be asked to grant the researcher auditor (i.e., co-teacher) access to your online classrooms (e.g., Google Classroom and Canvas) so that the asynchronous components of your instruction can be examined.

RISKS/DISCOMFORTS:

There are no foreseeable risks for participating in this research.

BENEFITS:

There are no direct benefits to you from participating in this study other than to further research in technology education.

This study may benefit the educational field by exploring the experiences of teachers in an embedded professional development program. Additionally, the findings may provide insight into teacher's implementation of blended learning resulting from participation in a blended learning cohort professional development program.

VOLUNTARY PARTICIPATION AND RIGHT TO WITHDRAW:

Your participation in this study is entirely voluntary: You choose whether to participate. If you

decide not to participate, there are no penalties, and you will not lose any benefits to which you would otherwise be entitled.

If you choose to participate in the study, you can stop your participation at any time, without any penalty or loss of benefits. If you want to withdraw from the study, please notify the Principal Investigator at any time during the study.

If we learn any new information during the study that could affect whether you want to continue participating, we will discuss this information with you.

CONFIDENTIALITY:

Any study records that identify you will be kept confidential to the extent possible by law. People responsible for making sure that research is done properly, including members of the Johns Hopkins University Homewood Institutional Review Board, may review the records from your participation. Otherwise, records that identify you will be available only to people working on the study, unless you give permission for other people to see the records. The researcher will use pseudonyms for the participants and the school site to protect the privacy of the participants and the school. Interviews will be audiotape recorded and uploaded to a password protected Google Drive folder. Classroom observation forms will also use pseudonyms and any screen shots of participants' online classrooms will obscure the teachers' names to ensure confidentiality.

Completed consent forms will be retained for a minimum period of 5 years from the date at which the project is completed. Shredding unwanted documents and permanently deleting all computer files will dispose of data at the end of this time period.

COMPENSATION:

You will not receive any payment or other compensation for participating in this study.

IF YOU HAVE QUESTIONS OR CONCERNS:

You can ask questions about this research study now or at any time during the study, by talking to the researcher working with you or by calling Izora Everson at 703.795.6486.

If you have questions about your rights as a research participant or feel that you have not been treated fairly, please call the Homewood Institutional Review Board at Johns Hopkins University at (410) 516-6580.

SIGNATURES:

WHAT YOUR SIGNATURE MEANS:
Your signature below means that you understand the information in this consent form.

By signing this consent form, you have not waived any legal rights you otherwise would have as a participant in a research study.

Participant's Signature	**Date**
Signature of Person Obtaining Consent (Investigator or HIRB Approved Designee)	**Date**

Appendix F

Semistructured Individual Interview Protocol

Script

Thank you so much for agreeing to participate in this interview. I appreciate the time you are able to share with me. I am conducting a study on teachers' technology experiences in a blended learning community of inquiry or blended learning cohort in the 2016-2017 school year. I am hopeful that you can share with me regarding your experiences in the blended learning cohort during the 2016-2017 school year. This interview will ask you about your instructional technology background, the PD activities you engaged in, and the experiences you had while participating in the blended learning cohort.

Please be honest in your responses and provide as much detail as possible. Do not hesitate to let me know at any time that you would like to stop the interview. With your permission, I will audio record our session. This recording will be uploaded immediately to my password protected Google Drive. I will provide you with a copy of the interview transcription for verification. The interview transcription will not be shared with anyone other than my dissertation co-advisers. At no time will I share your name or any other information that could be used to identify you. What pseudonym would you like to use for this interview to maintain confidentiality? Pseudonym: _____

Do you have any questions before we start?

I would like to start by asking you questions about your and your technology experiences at your school.

Interview Questions

Teacher Characteristics

1. What subject(s) do you teach?
2. What grade level(s) do you teach?
3. How many years of teaching experience do you have?
4. How many years have you taught in this school?
5. What is the highest level of education you have attained?
6. Why did you decide to participate in the blended learning cohort?
7. How often do you participate in technology-focused professional development?
8. How did your participation in the blended learning cohort change your thinking about learning?
9. How, if at all, are you participating in the blended learning cohort this year? PROBE: Are you helping to lead the 2017-2018 cohort?

Blended learning questions

10. Please describe your thoughts/attitudes/beliefs regarding instructional practices that integrate technology.
11. How do you use blended learning in your instruction? PROBE: How often do you implement blended learning?
12. What blended learning do you plan to implement during the 2017-2018 school year? Please explain your rationale for implementing blended learning. OR Please explain why you do not plan to use blended learning in the 2017-2018 school year.
13. Tell me about your experiences in the PD last year.

    Which blended learning cohort activities did you find effective in helping you to implement blended learning? (If participants are unsure, prompt them with examples of activities such as asynchronous communication, synchronous communication, blogging,

sharing best practices with peers via the course wiki, or discussing blended learning, etcetera).

14. Which blended learning cohort experiences did you find effective in helping you to implement blended learning? (If participants are unsure, prompt them with examples of experiences such as online format of the cohort, collaborating with peers, engaging in a book study, blended lesson planning, etcetera).
15. How did the format of the blended learning cohort (e.g., synchronous and asynchronous sessions, online resources, discussion board, wiki) help you implement blended learning? PROBE: If so, how? If not, why?

Script

Thank you so much for participating in this interview today. I greatly appreciate the time you have given me as well as your candid responses to my questions. Please feel free to call or e-mail me if you would like to speak further.

Appendix G

Semistructured Initial Case Study Interview Protocol

Script

Thank you so much for agreeing to participate in this interview. I appreciate the time you are able to share with me. As a case study participant, I would like to follow up on our earlier interview. I am conducting a study on teachers' technology experiences in a blended learning community of inquiry or a blended learning cohort. I am hopeful that you can provide some insight into your experience in the high school blended learning cohort. Specifically, this interview will ask you about your blended learning implementation and your technology collaboration.

Please be honest in your responses and provide as much detail as possible. Do not hesitate to let me know at any time that you would like to stop the interview. With your permission, I will audio record our session. This recording will be uploaded immediately to my password protected Google Drive. I will provide you with a copy of the interview transcription for verification. The interview transcription will not be shared with anyone other than my dissertation co-advisers. At no time will I share your name or any other information that could be used to identify you. Please state the pseudonym that you used during your prior interview, as I will use the same pseudonym you selected during the prior interview as your pseudonym for this interview. Pseudonym: _____

Do you have any questions before we start?

Interview Questions

Blended learning questions

1. During your time in the blended learning cohort, how, if at all, did you use the blended learning cohort resources available via Blackboard (e.g., toolkit, success center, blended news)? PROBE: Which resources did you find most helpful? Which ones were least helpful? Please provide a rationale for the resources that you found most and least helpful.
2. Describe your current blended learning practices.
3. Describe how you plan to use blended learning for the remainder of the current school year.
4. How did your participation in the blended learning cohort change your technology practices?
5. How did your shift in instructional practice change student experiences? PROBE: What are students doing differently in your classroom, due to blended learning?
6. How did your shift in instructional practice change student learning? How do you know?

Teacher decision making

7. Why did you first decide to use technology? When did you first decide to use blended learning?
8. How do you use student data to inform your instructional practice?
9. In what ways do you evaluate technologies to ensure their effectiveness?
10. When implementing blended learning, how do you decide which technology tool(s) to use?
11. When deciding to implement a blended learning lesson, please describe your instructional planning process. PROBE: How is your thinking during planning for blended learning different from planning for other instruction?

12. When implementing a blended learning lesson, how do you adjust instruction to meet students' needs? PROBE: When implementing blended learning, how do you adjust instruction differently, compared to traditional or typical instruction?
13. What factors do you consider when deciding to implement technology?
14. What factors do you consider when deciding which blended learning model or models that were presented in the PD (e.g., rotation model, flex model, self-blend model, enriched-virtual model) to implement?

School factors related to teachers' decision making

15. "School culture" can be defined as the ability to access resources using social relationships within the school and is integral to teachers' decision-making process (Frank, Zhao, & Borgman, 2004). Please describe the current school culture in your building.
16. What are your perceptions of differences between the current school culture and the school culture in your building during the 2016-2017 school year?
17. What do you perceive as your school administration's beliefs on the effectiveness of blended learning implementation.
18. Please describe the school-level supports available when you choose to implement blended learning in your classroom. PROBE: Please share any school-level supports that do not currently exist, but would be helpful in supporting your implementation of blended learning.
19. Please describe any challenges you encounter when implementing blended learning.

Script

Thank you so much for allowing me to interview you today. I greatly appreciate the time you have given me as well as your candid responses to my questions. Please feel free to call or e-mail me if you would like to speak further.

Appendix H

Semistructured Follow-Up Case Study Interview Protocol—Alice

Script

During this interview, I will ask you to reflect on several things: (a) notes made during classrooms observations, (b) your participation in the blended learning cohort, and (c) some of the comments you made during our initial case study interview.

Please be honest in your responses and provide as much detail as possible. Do not hesitate to let me know at any time that you would like to stop the interview. With your permission, I will audio record our session. This recording will be uploaded immediately to my password protected Google Drive. I will provide you with a copy of the interview transcription for verification. The interview transcription will not be shared with anyone other than my dissertation co-advisers. At no time will I share your name or any other information that could be used to identify you. I will use the same pseudonym you selected during the prior interviews as your pseudonym for this interview. Pseudonym: _____

Do you have any questions before we start?

Questions:

- When I observed your classroom lesson on watersheds, I noted that you used Nearpod to deliver content to students via their Chromebooks.
    - How might you have taught these skills in the past?
    - How did the technology tool you selected (Nearpod) support the objectives of this lesson?
- When I observed your classroom lesson on renewable and nonrenewable resources I noticed that you used Hapara to manage student Chromebook use during the lesson. You

also used Hapara to redirect student behavior.

    - What changes in student classroom management have you experienced as a result of blended learning?
    - How do you balance blended learning instruction with opportunities for students to learn appropriate technology use?

- When I observed your lessons on Google classroom, I noted that you frequently consolidate and/or extend student learning through the use of technology tools such as Edpuzzle and Quizlet.
    - How might you have taught these skills in the past?
    - How do these technology tools support the objectives of your lessons?
- In your previous interview, you mentioned that blended learning has led to increased opportunities for your students to make real-world connections. You said, *"Science is all real-world applications all the time, so it's really critical for me to make sure those are connected."* Please expand on that statement.
    - How has blended learning increased these opportunities?
    - How could you have experienced the same shift in student learning had you not utilized blended learning?
- In your previous interview, you stated that the school culture has improved this year and that there is more school-wide facility with technology. You also shared that this is an improvement over the prior year school year (2016-2017).
    - How do you perceive this shift continuing during the 2018-2019 school year?
- In your previous interview, you stated that your use of technology stemmed from your age respective to other members of your department. You said, *"I first decided to use*

technology because I was a young teacher on a team full of older teachers. There were two of us who were young and two who were much older by about 10 years of experience and I knew that they weren't going to." You also said, *"The older generation of teachers is still mistrustful of technology, but that's to be expected."* Could you elaborate on these statements?

    - Why do you feel older teachers are less likely to embrace technology?
    - Were there other personal attributes that contributed to your desire to use technology?

- In your previous interview, you expressed that there are opportunities for meaningful technology professional development within our school division. You said, *"My division offers opportunities for people who are interested in technology to grow that. And they give me time off to go do that sort of thing and to present at blended learning camp and they run a blended learning camp! My division is great. They let me do this kind of thing and they're usually supportive."*
    - Are there other technology professional development opportunities that would be useful?
    - What types of technology professional development would you like to see in the future?
- Is there anything you would like to add that you think would be relevant to this study?

Script

Thank you so much for allowing me to interview you today. I greatly appreciate the time you have given me as well as your candid responses to my questions. Please feel free to call or e-mail me if you would like to speak further.

Appendix I

Semistructured Follow-Up Case Study Interview Protocol—Julianne

Script

During this interview, I will ask you to reflect on several things: (a) notes made during classrooms observations, (b) your participation in the blended learning cohort, and (c) some of the comments you made during our initial case study interview.

Please be honest in your responses and provide as much detail as possible. Do not hesitate to let me know at any time that you would like to stop the interview. With your permission, I will audio record our session. This recording will be uploaded immediately to my password protected Google Drive. I will provide you with a copy of the interview transcription for verification. The interview transcription will not be shared with anyone other than my dissertation co-advisers. At no time will I share your name or any other information that could be used to identify you. Please state the pseudonym that you used during your prior interview, as I will use the same pseudonym you selected during the prior interviews as your pseudonym for this interview. Pseudonym: _____

Do you have any questions before we start?

Questions:

- When I observed your classroom lesson on presidential legacies I noted that students were using the TinkerCAD program to manufacture a 3D model of a presidential legacy.
    - How might you have taught these skills in the past?
    - How did the technology tool you selected (TinkerCAD) support the objectives of this lesson?
- When I observed your classroom lessons, I noticed that your students were engaged in

the learning, actively learning, and demonstrated a clear comprehension of appropriate technology use expectations.

    - What changes in student classroom management have you experienced as a result of blended learning?
    - How do you balance blended learning instruction with opportunities for students to learn appropriate technology use?

- When I observed your lessons on Google classroom, I noted that you frequently consolidate and/or extend student learning through the use of technology tools like Edpuzzle and Quizlet or by having students complete activities that required them to make real-world connections (such as your boundary stones assignment).
    - How might you have taught these skills in the past?
    - How do these technology tools support the objectives of your lessons?
- In your previous interview, you mentioned that blended learning has led to increased opportunities for your students to be innovators. You said, *"I think they are trying to tap into their creativity a tad bit more. Some kids will openly admit they're not very creative, but I think that they're being exposed to a lot of different programs, which may spark some creativity."* Please expand on that statement.
    - How has blended learning increased these opportunities?
    - Could you have experienced the same shift in student learning had you not utilized blended learning?
- In your previous interview, you stated that the school culture in your building is excellent and that school staff is focused on supporting student learning. You said, *"I think that we have professionals in the building that are always asking how they can help and always*

inquiring how they can support the classroom. There isn't probably a week that goes by that they do not email saying, "What can I do? What can I do to help you? So I think that there is that support. And then from the administration, I think they like to see us trying new things and implementing new ways of getting the kids to learn. I think they enjoy that."

    - How do you perceive this school culture progressing during the 2018-2019 school year?

- In your previous interview, you stated that your interest in technology stemmed from your desire to stretch outside of your comfort zone and that you decided to implement blended learning to keep up with current technology trends. You said, *"I feared that I was growing older and not keeping up. I don't want to be, and I am sad to say this but I have seen teachers that are so uncomfortable with the technology in the building, that they are almost paralyzed with fear to even try."* Could you elaborate on this statement?
    - Why do you feel older teachers are less likely to embrace technology?
    - Were there other personal attributes that contributed to your desire to use technology?
- In your previous interview, you expressed that blended learning requires significant time for planning and preparation. You said, *"It's more time consuming because I'm going to have to play with the program myself for quite a bit so that I see all the pitfalls, all the possible things that could go wrong because you can't afford to have that going on with 30 children that are 11. So you have to dedicate a large amount of time to play with the program if it's unfamiliar to you."*
    - What do you perceive to be the benefits of blended learning that make it worth the

additional preparation time required?

- Is there anything you would like to add that you think would be relevant to this study?

Script

Thank you so much for allowing me to interview you today. I greatly appreciate the time you have given me as well as your candid responses to my questions. Please feel free to call or e-mail me if you would like to speak further.

Appendix J

Semistructured Follow-Up Case Study Interview Protocol—Mary

Script

During this interview, I will ask you to reflect on several things: (a) notes made during classrooms observations, (b) your participation in the blended learning cohort, and (c) some of the comments you made during our initial case study interview.

Please be honest in your responses and provide as much detail as possible. Do not hesitate to let me know at any time that you would like to stop the interview. With your permission, I will audio record our session. This recording will be uploaded immediately to my password protected Google Drive. I will provide you with a copy of the interview transcription for verification. The interview transcription will not be shared with anyone other than my dissertation co-advisers. At no time will I share your name or any other information that could be used to identify you. Please state the pseudonym that you used during your prior interview, as I will use the same pseudonym you selected during the prior interviews as your pseudonym for this interview. Pseudonym: _____

Do you have any questions before we start?

Questions:

- When I observed your classroom instruction, I noted that you frequently structured warm ups through Google Forms.
    - How might you have conducted these content reviews in the past?
    - How did the technology tool you selected (Google Forms) support your instructional objectives?
- When I observed your classroom lesson utilizing the station rotation blended learning

model, I noticed that you had to frequently redirect student behavior.

    - What changes in student classroom management have you experienced as a result of blended learning?
    - How do you balance blended learning instruction with opportunities for students to learn appropriate technology use?

- When I observed your lessons on Google classroom, I noted that you frequently consolidate and/or extend student learning through the use of technology tools such as Edpuzzle and Quizlet.
    - How might you have taught these skills in the past?
    - How do these technology tools support the objectives of your lessons?
- In your previous interview, you stated that the blended learning cohort encouraged you to stretch yourself with regard to technology. You said, *"I'm not afraid anymore."* Please expand on that statement.
    - How did participation in the blended learning cohort increase your technology confidence?
    - What made the blended learning cohort different from other technology professional developments that you have attended?
- In your previous interview, you stated that blended learning allows for differentiation of instruction. Specifically, you shared that you use Reading A-Z for one of your lower-level students, while you simultaneously provide alternate content for higher-level students via the Chromebooks.
    - How has blended learning made it easier to differentiate instruction?
    - Could you have experienced the same shift in student learning had you not

utilized blended learning?

- In your previous interview, you stated that lack of follow through and lack of accountability has led to uneven technology adoption and use practices. You said, *"You need to have a Canvas. So then it was like we needed to have a Canvas running by February. So everyone was rushing around to have a Canvas running. And then it was like, 'You need to have this done by this.' But then no one checked anything. And then we were having PDs that are really useful. I do think that we need to continue to have the PD time, but then they overload you with 17 different PDs. And the PD that we need to know on how to use Canvas is pushed to the side, and then you lose that time. And then it's just all about your PLC, PLC, data, data, data. Take this test; do this test. And if you want me to be good at something, I need that continued practice with it, and I felt bad actually for our TISs because I felt like it kind of just got pushed to the side. And you're going to come back in September, and it's going to be like, 'You need to have this done.'"* Could you elaborate on these statements?
    - How could continued technology practice be supported in the school?
    - How has the lack of follow through and lack of accountability in your school impacted your technology practices?
- In your previous interview, you expressed that there are opportunities for meaningful technology professional development within our school division, but that there is not sufficient time. You said, *"I think if I knew that on the second Thursday of the, or every second Thursday of the month, I knew that I was going to have one period dedicated to technology resources, and it was untouched. Like I said, we've tried things like that, but things get pushed by the side. And instead of mastering nothing, maybe we try 100 things*

and we master nothing. Let's try three things and master three."

- Are there other technology professional development opportunities that would be useful?
- What do you perceive to be good incentives for teachers to use technology?

- Is there anything you would like to add that you think would be relevant to this study?

Script

Thank you so much for allowing me to interview you today. I greatly appreciate the time you have given me as well as your candid responses to my questions. Please feel free to call or e-mail me if you would like to speak further.

Appendix K

Face-to-Face Classroom Observation Protocol

iNACOL Blended Learning Teacher Competency Framework

Blended Teaching Competencies

Domain 1: Mindsets[1]

Blended teachers should:

Competency 1: New vision for teaching and learning

Standard A: Shift from teacher-led instruction to student-centered learning for the purposes of meeting individual needs and fostering engagement and motivation.

Standard B: Value collaboration with various stakeholders to enhance student learning.

Standard C: Create learning environments that are flexible and personalized, dependent on real-time data, direct observation, and interaction with and feedback from students.

Standard D: Model a growth-orientation towards learning for self and others.

Standard E: Have an entrepreneurial spirit, and possess creativity, imagination, and drive.

Competency 2: Orientation toward change and improvement

Standard A: Embrace change and model this for others.

Standard B: Proactively initiate change in response to students' needs and progress.

Standard C: Embrace uncertainty and ambiguity as part of improving teaching and learning practices.

Standard D: Model and encourage others to be independent and self-directed learners.

Standard E: Demonstrate the professional responsibility to contribute to the effectiveness, innovation, vitality, and self-renewal of the teaching profession, as well as to their school and community.

Domain 2: Qualities

Blended teachers should:

Competency 1: Grit

Standard A: Engage in deliberate practice and persevere toward ambitious, long-term educational and professional goals.

Standard B: Maintain and model persistence, confidence, and optimism to resolve issues.

Competency 2: Transparency

Standard A: Openly and frequently share successes, failures, and challenges.

Standard B: Look objectively at all results (both positive and negative), and help others to do the same.

Competency 3: Collaboration

Standard A: Balance individual initiative with teamwork to accomplish organizational objectives.

Standard B: Proactively seek to learn from and with other experts in the field.

Domain 3: Adaptive Skills

Blended teachers should:

Competency 1: Reflection

Standard A: Continuously take note of what is or is not working (via student-level data, technology applications, pedagogical strategies, supervisor feedback, etc) and identify a plan of action.

Standard B: Collaboratively, transparently, and proactively seek out feedback from students, parents, and colleagues to continuously improve instruction and teaching practices.

Standard C: Apply lessons and takeaways about their own experiences as learners, both online and offline, to their work with students.

Competency 2: Continuous improvement and innovation

Standard A: Engage in problem solving through continuous planning, designing, testing, evaluation, and re-calibration of teaching methods.

Standard B: Use technology creatively and purposefully to work effectively and efficiently.

Competency 3: Communication

Standard A: Connect learners to sources of information beyond the classroom teacher and textbook.

Standard B: Establish and maintain open communication channels, online and in person, with students, educators, and other stakeholders to support student learning.

Domain 4: Technical Skills

Blended teachers should:

Competency 1: Data Practices

Standard A: Use qualitative and quantitative data to understand individual skills, gaps, strengths, weaknesses, interests, and aspirations of each student, and use that information to personalize learning experiences.

Standard B: Continually assess student progress against clearly defined standards, goals, and outcomes to identify specific topics in which each student needs additional support to achieve mastery of a concept or skill.

Standard C: Use data from multiple sources, including data systems, in a complementary way to inform and adjust individual student instruction and groupings.

Standard D: Create ways to move ownership and analysis of data to students to promote independent learning.

Standard E: Continually evaluate technologies, tools, and instructional strategies to ensure their effectiveness.

Competency 2: Instructional Strategies

Standard A: Provide resources for students to learn content and enable them to work independently and/or in cooperative groups.

Standard B: Provide resources for students to create evidence of their knowledge in a variety of formats to demonstrate mastery.

Standard C: Create customized learning pathways with students, where learning goals and objectives are linked to explicit and diverse learning experiences, matched to the individual student's learning performance level and preferences.

Standard D: Tailor content and instructional strategies to individual learning goals, needs, and interests.

Standard E: Create pedagogical approaches and learning experiences that promote content-based problem-solving and online collaboration.

Standard F: Develop and deliver valid and reliable assessments, projects, and assignments that meet standards-based criteria and assess learning progress by measuring student achievement of learning goals.

Competency 3: Management of Blended Learning Experience

Standard A: Understand and manage the face-to-face and online components of lesson planning and organization within a blended course.

Standard B: Provide balanced opportunities for students to participate in asynchronous and synchronous modalities.

Standard C: Develop, practice, model, and embody respectful behaviors in both face-to-face and online learning environments.

Standard D: Demonstrate technical troubleshooting skills during the online component of learning (e.g., change passwords, download plug-ins, etc.).

Competency 4: Instructional Tools

Standard A: Use learning management system and/or other online collaborative tools to organize and manage the blended learning environment.

Standard B: Demonstrate skill in the evaluation, selection, and use of effective instructional materials, tools, strategies, and resources for students, and engage students in this process to help their achievement and development of academic skills.

Standard C: Provide assistive technologies to facilitate learning. *Link to A & E pub

Reprinted from "iNACOL blended learning teacher competency framework," by A. Powell, B. Rabbit, and K. Kennedy, 2014, https://www.inacol.org/resource/inacol-blended-learning-teacher-competency-framework/.

Appendix L

Online Classroom Observation Protocol

Teacher's Name: _____ Observation Date: _____

Content Area: _____

iNACOL Blended Learning Teacher Competency	**Canvas screenshot and detailed description of screenshot**
Shows a learning environment that is flexible and personalized to individual students (Domain 1, Competency 1, Standard C)[a]	
Shows a connection to sources of information beyond the classroom teacher and textbook (Domain 3, Competency 3, Standard A)[a]	
Establishes and maintains open online communication channels with students, educators, and other stakeholders to support student learning (Domain 3, Competency 3, Standard B)[a]	
Shows a variety of resources for students to learn content (Domain 4, Competency 2, Standard A)[a]	
Shows use of Canvas, or other online collaborative tools, to organize and manage the blended learning environment (Domain 4, Competency 4, Standard A)[a]	
Shows selection of blended learning technology tools, strategies, and/or resources for students (Domain 4, Competency 4, Standard B)[a]	

[a]Adapted from Powell et al. (2014). Reprinted from "iNACOL blended learning teacher competency framework," by A. Powell, B. Rabbit, and K. Kennedy, 2014, *iNACOL*. Copyright 2014 by iNACOL. Reprinted with attribution under Open Access Creative Commons.

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